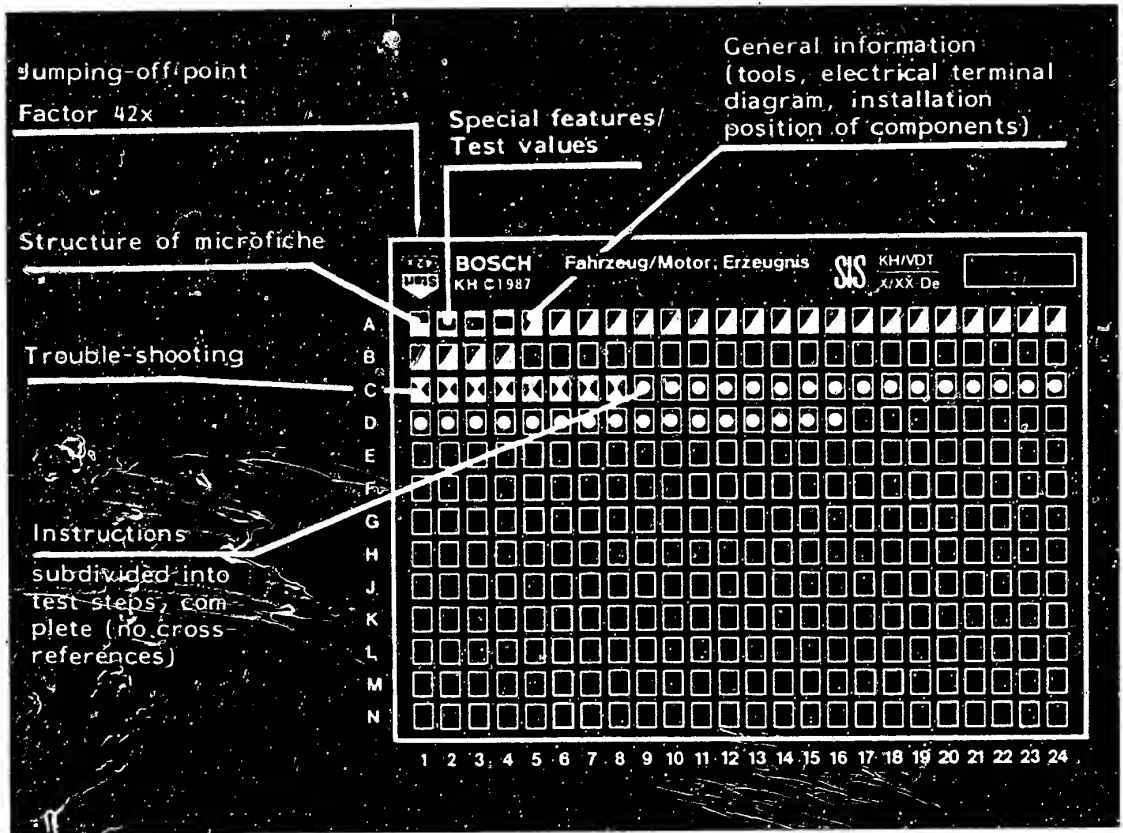


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E 16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

A1

Trouble-shooting program



1. Special features

190 E 4-cyl. engine 102.962 version ECE/CAT

230 E 4-cyl. engine 102.982 version ECE/CAT

1985 year of manufacture, worldwide excluding USA, J, AUS

Equipped with:

EI (electronic ignition) control unit 0 227 400 5..
(with current limitation)

or

Siemens control unit (Daimler Benz service part)

Note: Bosch and Siemens control units are interchangeable.

Ignition coil 0 221 5..

2. Test specifications

Ignition coil, primary	0.3 ... 0.6 Ω
Ignition coil, secondary	7.3 ... 13.2 k Ω

C11

Coolant- temperature sensor	+ 20°C	2.1 ... 2.9 k Ω
	+ 30°C	1.4 ... 2.0 k Ω
	+ 80°C	280 ... 370 Ω
	+ 90°C	210 ... 280 Ω
	+ 100°C	160 ... 215 Ω

C19

Spark-advance angle without vacuum
Vehicles with catalytic converter

C17

Fuel	Adjustment plug EZL* (white)	Adjustment plug EZL-KAT (green)	Engine speed min ⁻¹ or ° CS BTDC
Premium unleaded	Position 4	Position S	3200 25-29°
Regular unleaded	Position 6	Position N	3200 19-23°

C23

*Adjustment plug was installed only temporarily. To prevent incorrect measurements, be sure to perform testing as per information on Coordinates.

A2

Test specifications

Mercedes-Benz



Spark-advance angle without vacuum.
Vehicles without catalytic converter.

Fuel	Adjustment plug EZL* (white)	Adjustment plug EZL-ECE (white)	Engine speed min ⁻¹ or ° CS BTDC
Premium unleaded/ leaded	Position 1	Position S	3200 25-29°
Regular unleaded/ leaded	Position 3	Position N	3200 19-23°

C17

C23

* Adjustment plug was installed only temporarily.

To prevent incorrect measurements, be sure to perform testing as per information on Coordinates.

Adjustment-plug position, version

C23

	EZL*	EZL-* ECE	EZL-** KAT
* Code colour: white	1	S	1 = ∞ Ω
** Code colour: green	2	2	2 = 2.4 kΩ
	3	N	3 = 1.3 kΩ
	4	4	S = 750 Ω
	5	5	5 = 470 Ω
	6	6	N = 220 Ω
	7	7	7 = 0 Ω

Power supply
to EI control unit and
ignition coil with
engine idling

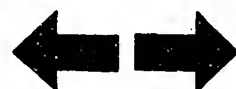
12 ... 14 V
max. 1 V
below U_B

D5

A3

Test specifications

Mercedes-Benz



Primary voltage
with engine idling

280 ... 360 V

D9

Internal resistance
of pulse generator

680 ... 1200 Ω

D11

Insulation of
pulse generator

$\infty \Omega$

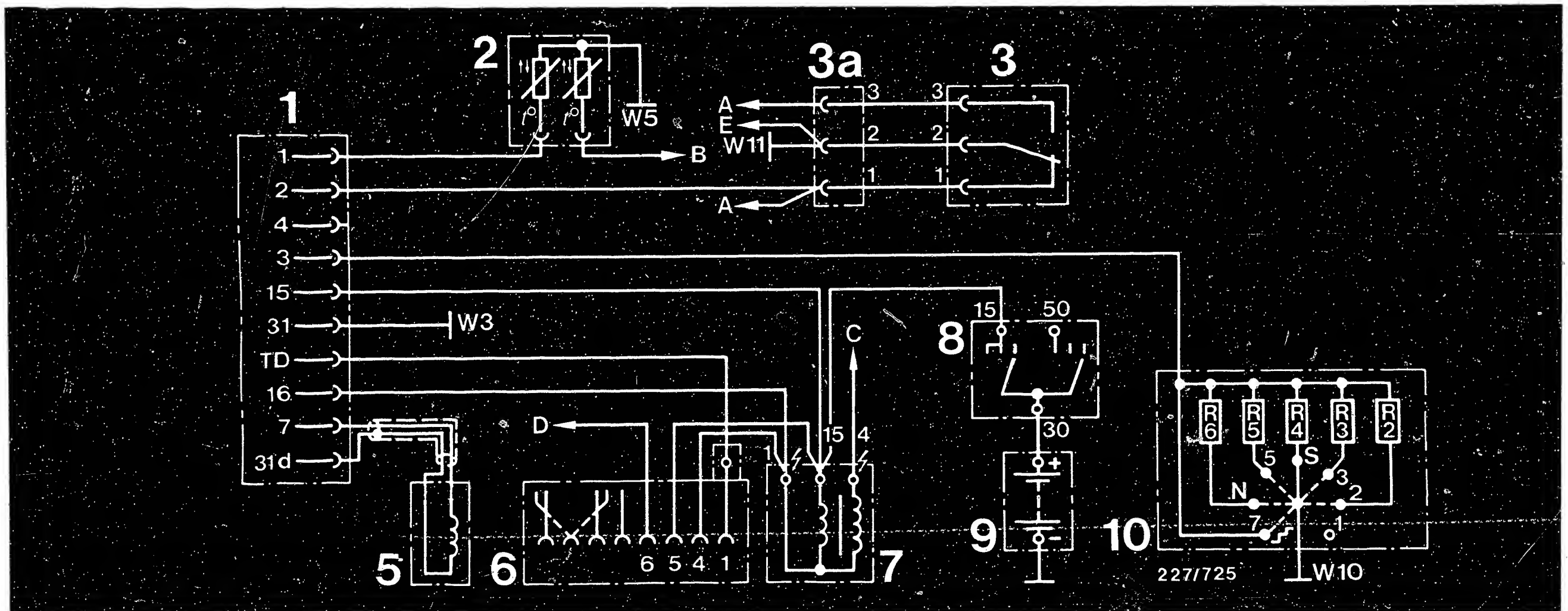
See Autodata test specifications for settings for idle
speed, exhaust gas etc.

A4

Test specifications

Mercedes-Benz





Danger arrows:
Warning: 400 V ... 25kV

- | | | | |
|---|---|--|--|
| 1 = EI control unit | 6 = Diagnostic socket | A = To KE-Jetronic control unit | W 3 = Ground, wheel housing |
| 2 = Coolant-temperature sensor (Double NTC) | 7 = Ignition coil | B = To KE-Jetronic control unit | front left (ignition coil) |
| 3 = Throttle-valve switch | 8 = Ignition/starting switch | C = To high-voltage distributor | W 5 = Ground, engine |
| 3a = Throttle-valve switch plug connector | 9 = Battery | D = Engine plug connector (term. 30) | W 10 = Ground, battery |
| 5 = Pulse generator | 10 = Adjustment plug label e.g. for EZL-KAT | E = To intake-air temperature sensor (KE-Jetronic) | W 11 = Ground, engine (electrical lead screwed on) |

3. Electrical terminal diagram

A5

Electrical terminal diagram

Mercedes-Benz

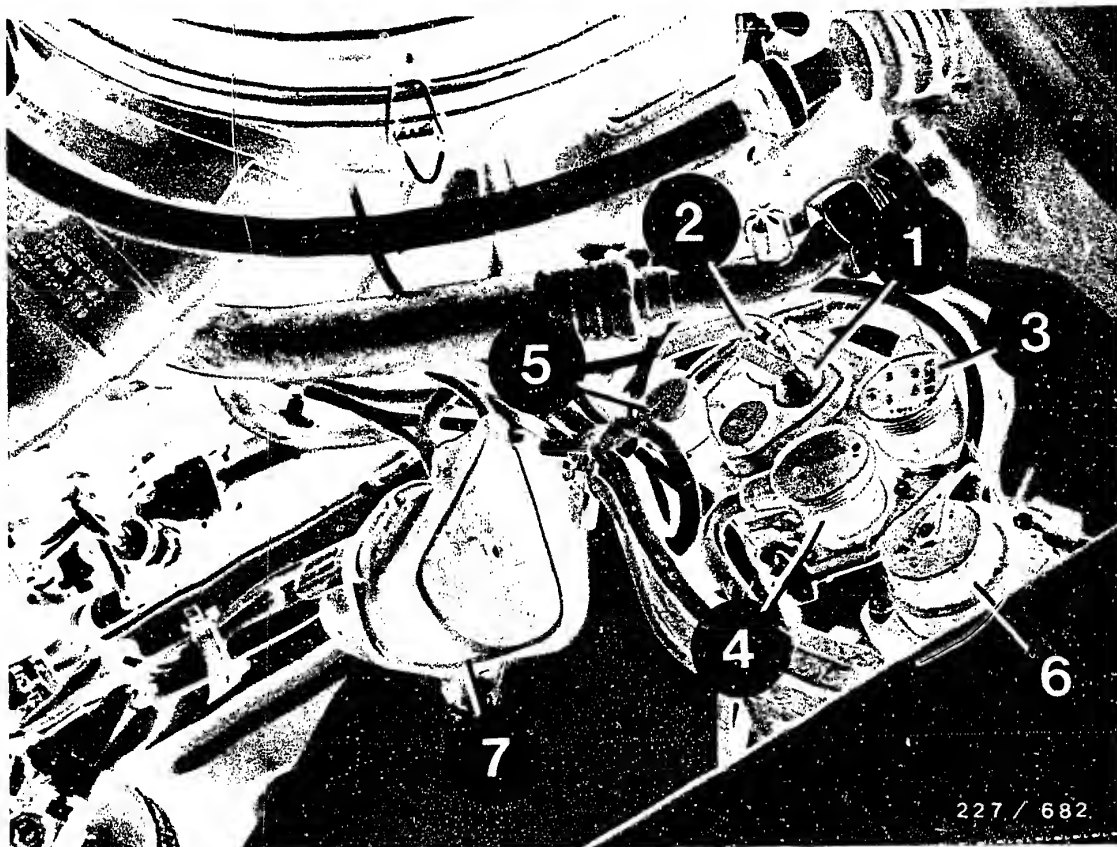


A6

Electrical terminal diagram

Mercedes-Benz





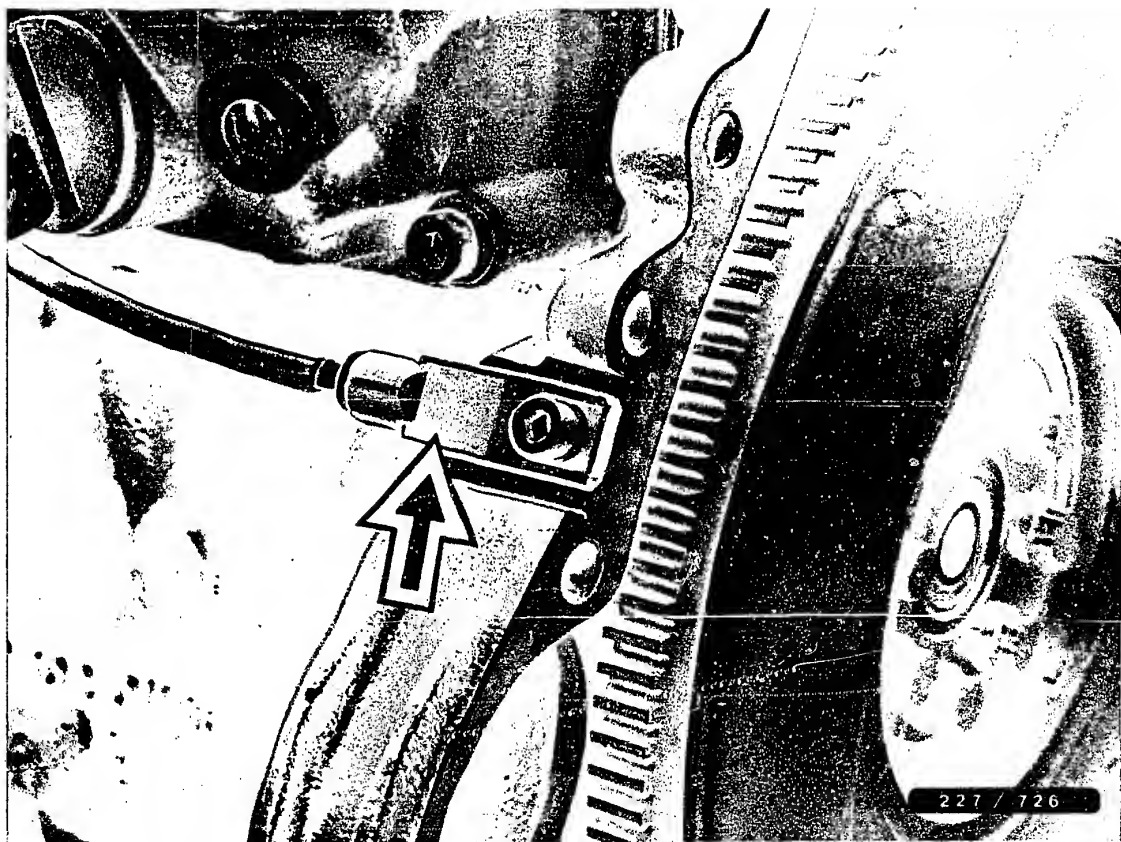
227 / 682

- 1 = Electronic ignition control unit
e.g. vehicle type 124
- 2 = Vacuum hose
- 3 = Quadruple plug - power supply
- 4 = Quadruple plug - sensor
- 5 = Coaxial plug - pulse generator
- 7 = Plastic ignition coil with protective cover

4. Installation position of components

Electronic-ignition control unit, diagnostic socket and ignition coil are situated on the wheel housing on the left-hand side as viewed in the forward direction of travel.



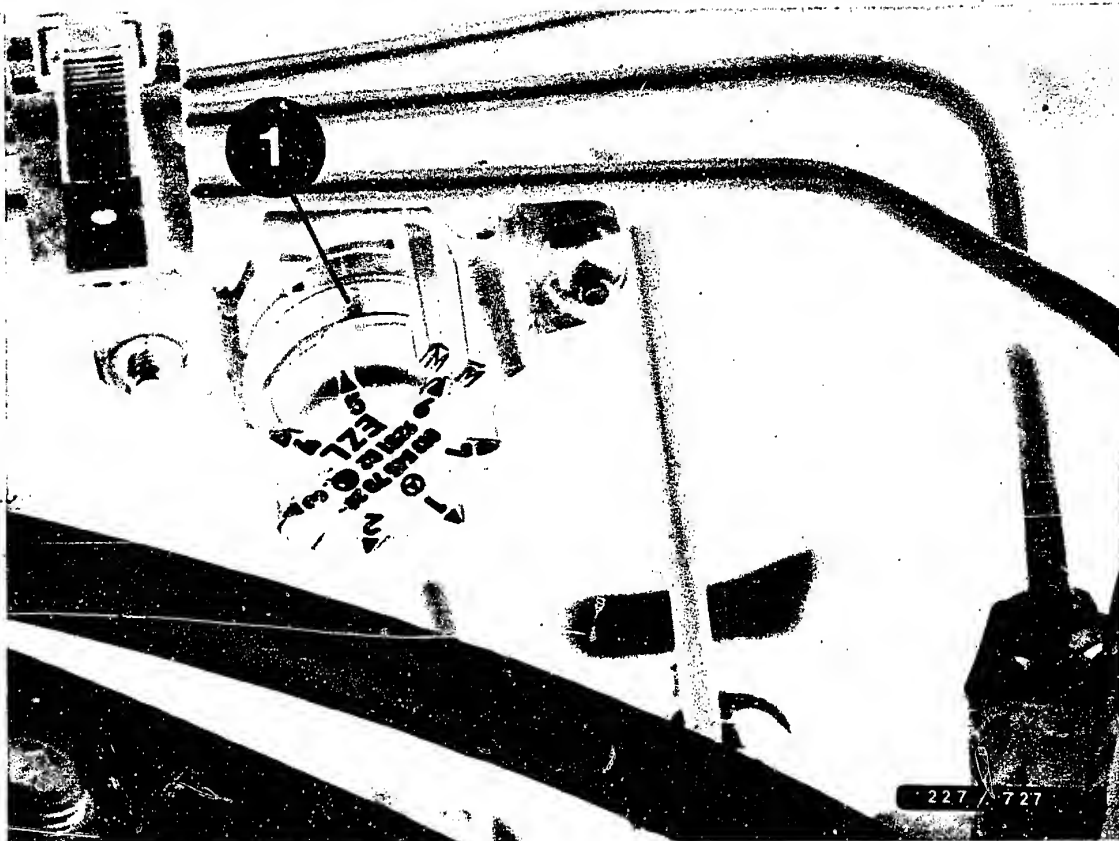


Pulse generator is above starting motor. See picture, arrow.

A8

Installation position of components
Mercedes-Benz





Ignition-adjustment plug e.g. vehicle type 124

Adjustment plug is on the partition wall of the equipment space (near brake master cylinder or fuse box).

A9

Installation position of components

Mercedes-Benz

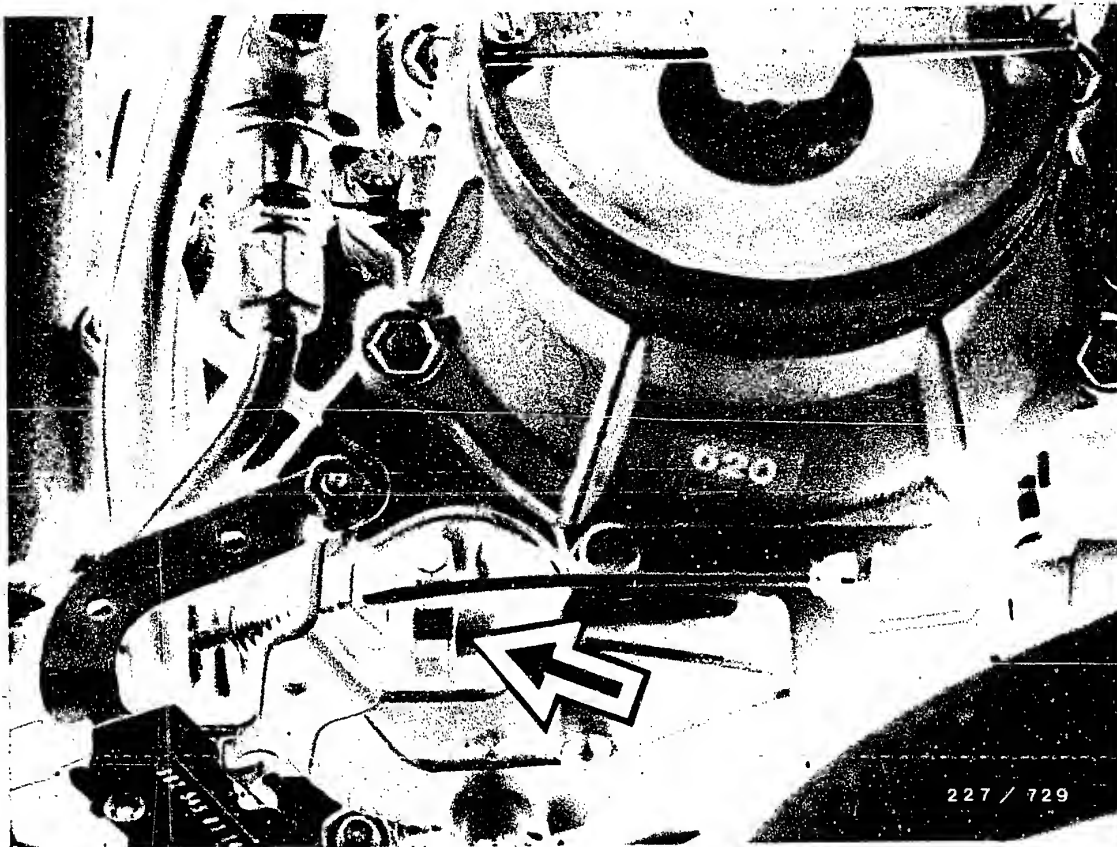




Arrow = Coolant temperature sensor (double NTC)

The coolant temperature sensor is located at the front on the cylinder head (thermostat housing).





Arrow = Throttle-valve switch

The throttle-valve switch is located on the throttle-valve assembly.



5. Necessary test equipment and aids

Motortester e.g.	MOT 201	0 684 000 201
Pulse shaper (required for measuring the primary voltage with MOT 201, 202, 206 and 400)		1 684 463 154
Adapter lead for the diagnosis socket		1 684 463 094
Spark gap e. g. ignition coil and condenser tester	EFAW 106 A	0 681 100 001
or single spark gap	EF 1177/7	1 684 531 000
5 k Ω sleeve-type suppressor		0 356 500 001
Ohmmeter	ETE 014.00	0 684 101 400
or e. g.	Pontava Wh2	commercially available
Voltmeter e.g.	ETE 014.00	0 684 101 400
Thermal conduction paste		5 942 860 003
Test prod, red		1 684 485 035
Test prod, black (for correct connection of test equipment at connectors)		1 684 485 034



6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts of terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

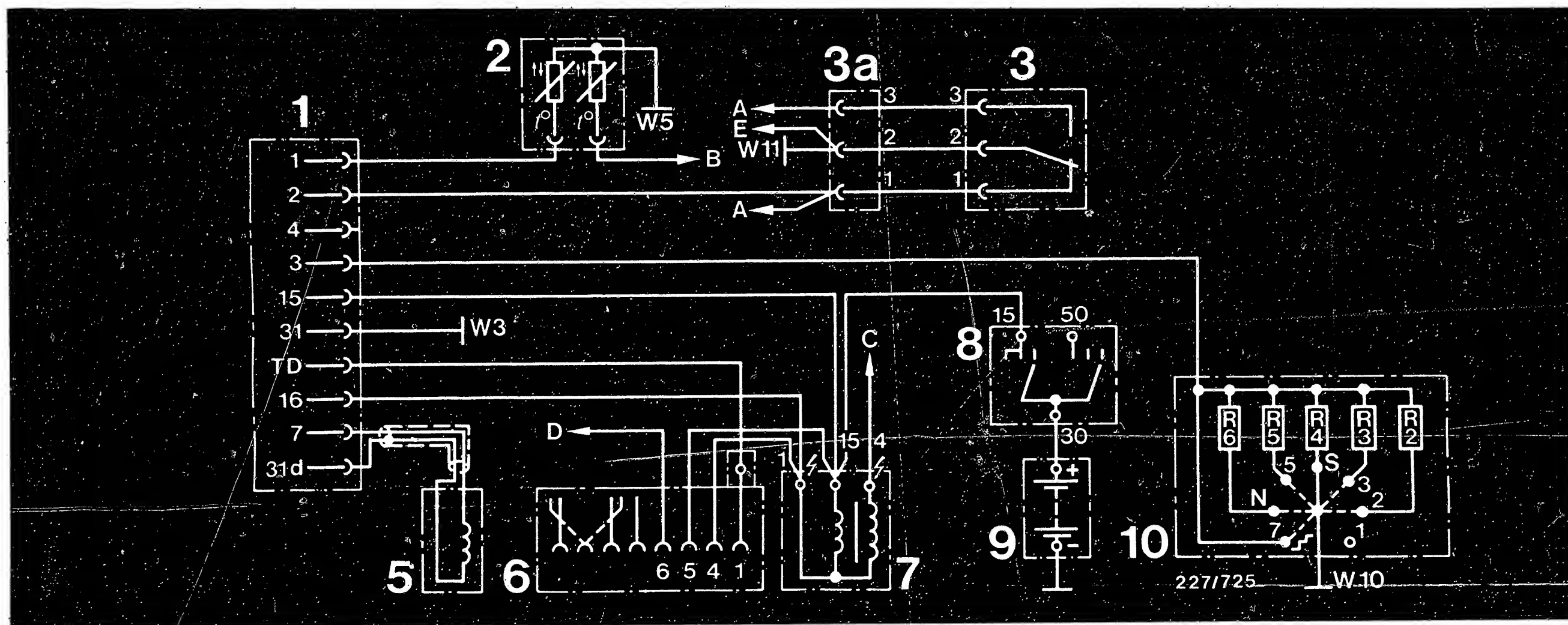
The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

- Connecting of engine test equipment. (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc.).

If, while testing the ignition system or during adjustment work on the engine (e.g. KE-Jetronic), it becomes necessary to switch on the ignition (switch on ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

The danger of accident exists, therefore, not only on the individual assemblies of the ignition system (e. g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e. g. tachometer connection, diagnostic plug), at plug-in connections and test equipment.





Danger arrows:
Warning: 400 V ... 25kV

- | | | | |
|---|---|--|--|
| 1 = EI control unit | 6 = Diagnostic socket | A = To KE-Jetronic control unit | W 3 = Ground, wheel housing front left (ignition coil) |
| 2 = Coolant-temperature sensor (Double NTC) | 7 = Ignition coil | B = To KE-Jetronic control unit | W 5 = Ground, engine |
| 3 = Throttle-valve switch | 8 = Ignition/starting switch | C = To high-voltage distributor | W 10 = Ground, battery |
| 3a = Throttle-valve switch plug connector | 9 = Battery | D = Engine plug connector (term. 30) | W 11 = Ground, engine (electrical lead screwed on) |
| 5 = Pulse generator | 10 = Adjustment plug label e.g. for EZL-KAT | E = To intake-air temperature sensor (KE-Jetronic) | |

Electrical connection diagram

The hazard locations are identified with high voltage arrows using, as an example, the connection diagram for an electronic ignition system.

A14

Accident hazard
Mercedes-Benz



A15

Accident hazard
Mercedes-Benz



7. Incorrect indication of engine speed, dwell angle and ignition timing

In the case of ignition systems with control unit 0 227 400 5.. and those of Siemens (EI) with current limitation, there may be an incorrect indication of engine speed, dwell angle and ignition timing on testers.

For further details see Coordinates N 7 - N 11.



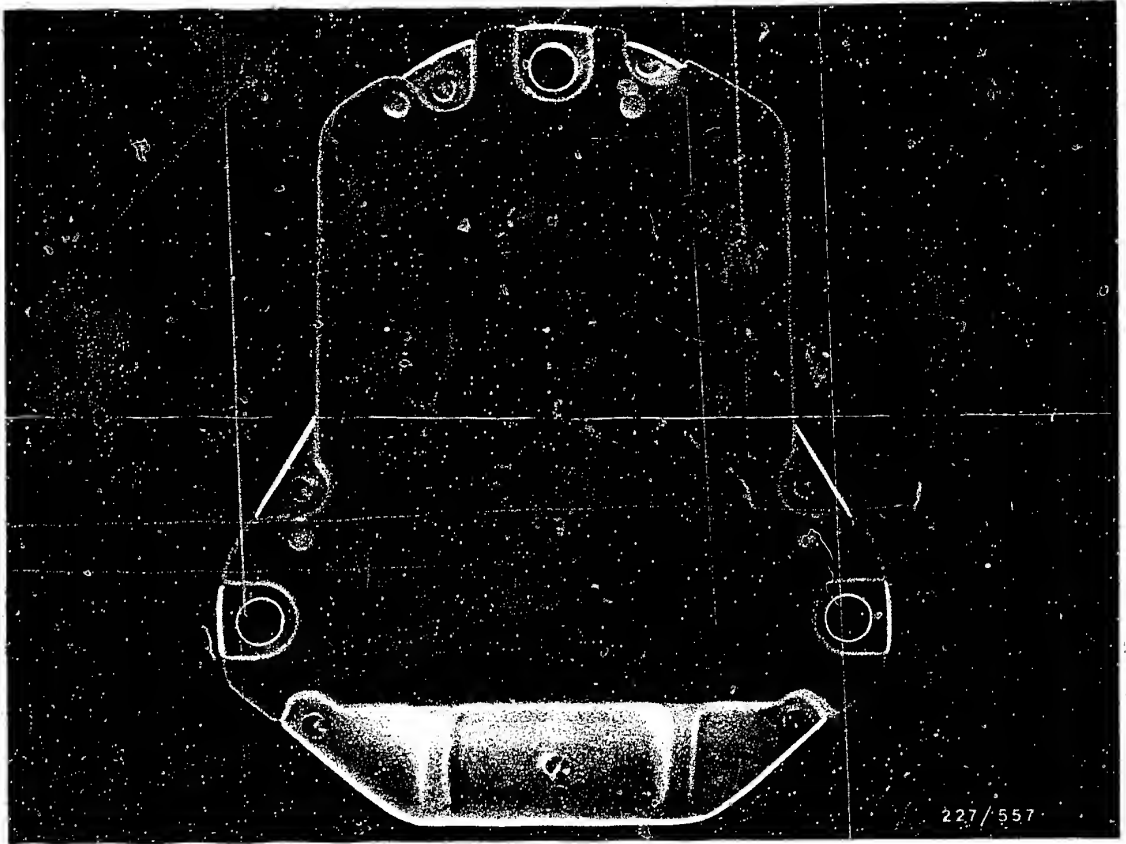
8. Important vehicle information

- Resistance measurements must only be performed with the ignition switched off or with the battery disconnected (measuring instrument defective).
- For a compression test, disconnect the coaxial plug (pulse generator) from the electronic ignition control unit.
- Never disconnect the battery while the engine is running.
- A starting assist with more 16 Volts or with a quick-charger is not permitted.
- The specified ignition coil (see Part.No.) must not be replaced with a different ignition coil.
- No suppression capacitor must be connected to ignition coil terminal 1.
- Ignition coil terminal 1 must not be brought into contact with ground as a theft-proofing measure (ignition coil will be destroyed when ignition is switched on).
- No battery + or test lamp must be connected to ignition coil terminal 1 (the electronic ignition control unit is destroyed).
- The ignition lead from the ignition coil Term. 4 to the high voltage distributor Term. 4 must not be disconnected during operation.
- There must be no arcing from ignition coil terminal 4 to ignition coil terminal 1 and 15.
The electronic ignition control unit can be destroyed.



- If the poles are reversed on the ignition coil (Term. 1 and Term. 15) there are severe losses of ignition energy, causing missing. In addition, the electronic ignition control unit is overloaded. In order to preclude reversal of poles, the terminal studs have different diameters. (M5 and M6)
- In order to avoid destruction of the electronic ignition control unit, the secondary end of the ignition system must have interference suppression of min. 2 k Ω . The original distributor rotor must be installed with an interference suppression resistor of 1 k Ω . (Do not use a 5 k Ω distributor rotor for radio and interference suppression either.)
- If the poles on the battery are incorrectly connected, the electronic ignition control unit and the ignition coil are destroyed.

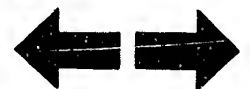


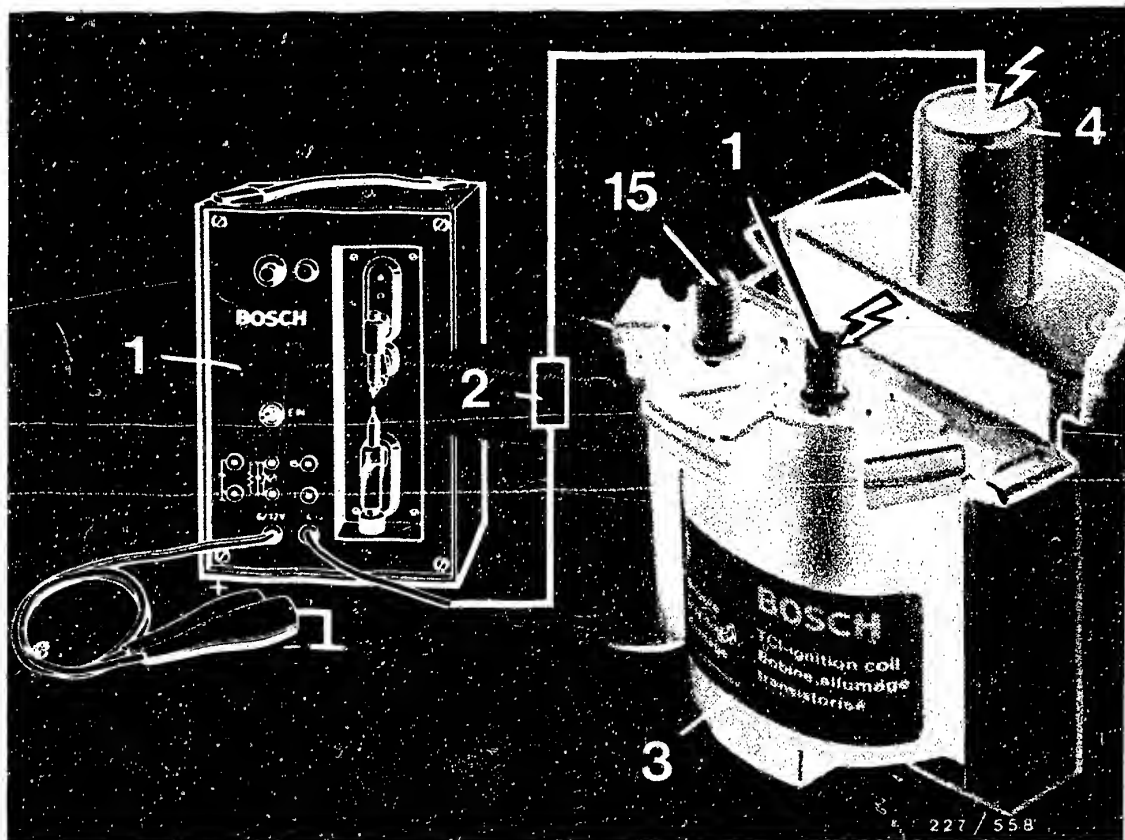


- Before putting on the electronic ignition control unit, the base plate (see the Figure, bright surface) must be coated with a heat conduction paste.

Apply thermal conduction paste only with a suitable object (screwdriver, etc.).

Do not apply thermal conduction paste to painted parts.





High voltage arrows:

Warning, 400 V ... 25 kV!

1 = Spark gap

2 = 5 k sleeve-type suppressor

3 = Ignition coil

- When using a spark gap - in order to prevent irreparable damage to the electronic-ignition control unit - an interference-suppression resistor of at least 2 k Ω must be connected between the spark gap and ignition coil terminal 4, e.g. sleeve-type suppressor (5 k Ω) 0 356 500 001.

Adapting the ignition timing to existing fuel

1. General

These vehicles can be driven on PREMIUM and REGULAR FUEL - leaded or unleaded. For this purpose, the ignition timing must be set appropriately. To adjust, withdraw adjustment plug as far as it will go, turn to appropriate position and plug on again. See illustrations.

Markings on adjustment plug

S = unleaded or leaded premium fuel

N = unleaded or leaded regular fuel

ECE = operation without lambda closed-loop control

KAT = operation with lambda closed-loop control

This setting to PREMIUM or REGULAR FUEL can also be performed by the customer.

Note:

The optimum performance and consumption figures are obtained when operating on PREMIUM FUEL.

If a change is made from PREMIUM to REGULAR FUEL, it is absolutely necessary to adapt the ignition timing (risk of engine damage). The ignition timing should likewise be adjusted if a change is made from REGULAR to PREMIUM FUEL.

2. IGNITION TIMING - adjustment on vehicle WITHOUT CATALYTIC CONVERTER

2.1 Ignition timing for leaded and unleaded PREMIUM FUEL

ADJUSTMENT PLUG with label EZL 1-7

(White code colour) in POSITION "1". See top picture.

Note: This adjustment plug was installed only temporarily.
or

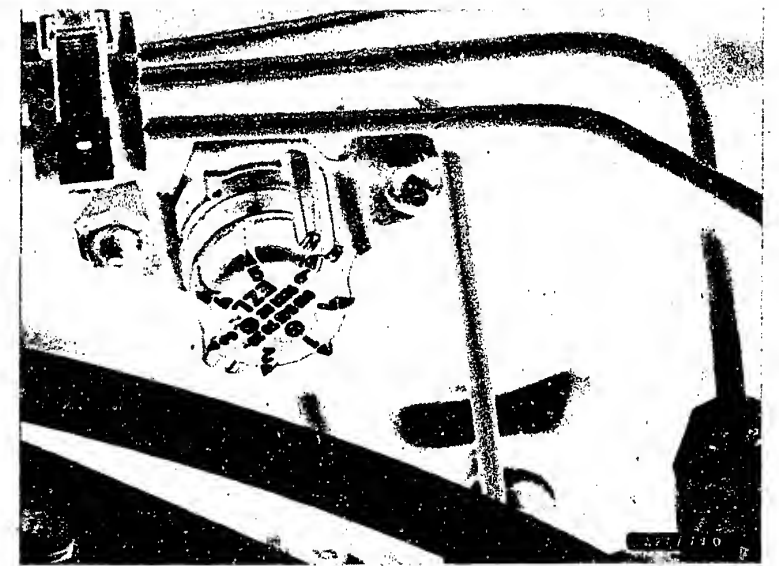
ADJUSTMENT PLUG with label EZL / ECE

(White code colour) in POSITION "S". See bottom picture.

Correction position for the workshop

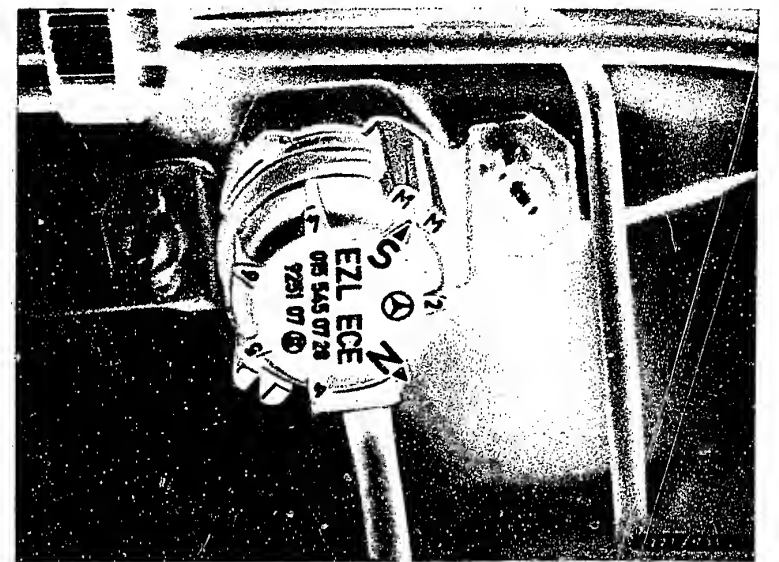
In the case of poor-quality premium fuel, set adjustment plug (top picture/bottom picture) to position "2".

Ignition timing is RETARDED by 3°.



Adjustment plug position "1"
(picture shows position "6")
e.g. vehicle type 124

Adjustment plug position "S"
e.g. vehicle type 124



A21

Important vehicle information

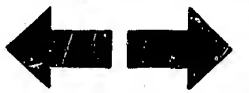
Mercedes-Benz



A22

Important vehicle information

Mercedes-Benz

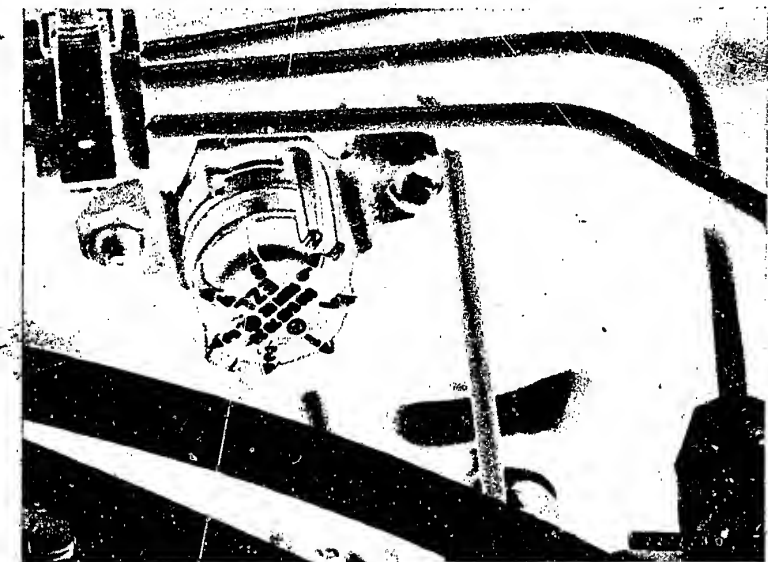


2.2 Ignition timing for leaded and unleaded REGULAR FUEL

ADJUSTMENT PLUG with label EZL 1-7
(White code colour) in position "3". See top picture.

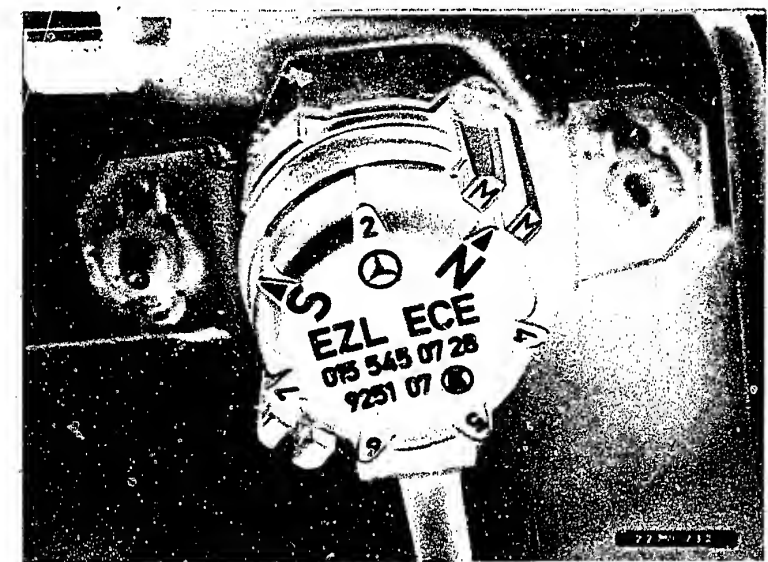
Note: This adjustment plug was installed only temporarily
or

ADJUSTMENT PLUG with label EZL / ECE
(White code colour) in position "N". See bottom picture.



Adjustment plug position "3"
(Picture shows position "6")
e.g. vehicle type 124

Adjustment plug position "N"
e.g. vehicle type 124



A23

Important vehicle information

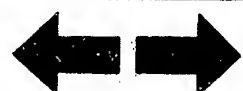
Mercedes-Benz



A24

Important vehicle information

Mercedes-Benz



3. IGNITION TIMING - adjustment on vehicle WITH CATALYTIC CONVERTER

3.1 Ignition timing for unleaded PREMIUM FUEL

ADJUSTMENT PLUG with label EZL 1-7

(white code colour) in position "4". See top picture.

Note: This adjustment plug was installed only temporarily.
or

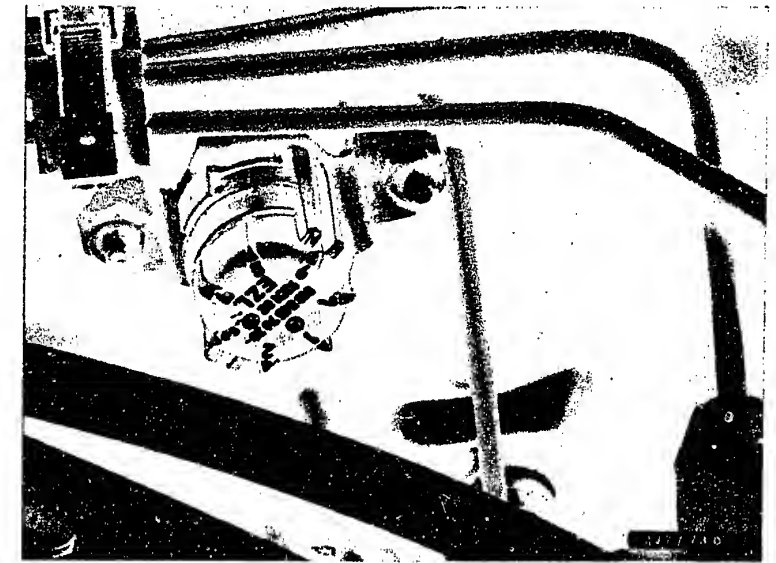
ADJUSTMENT PLUG with label EZL/KAT

(Green code colour) in position "S". See bottom picture.

Correction position for the workshop

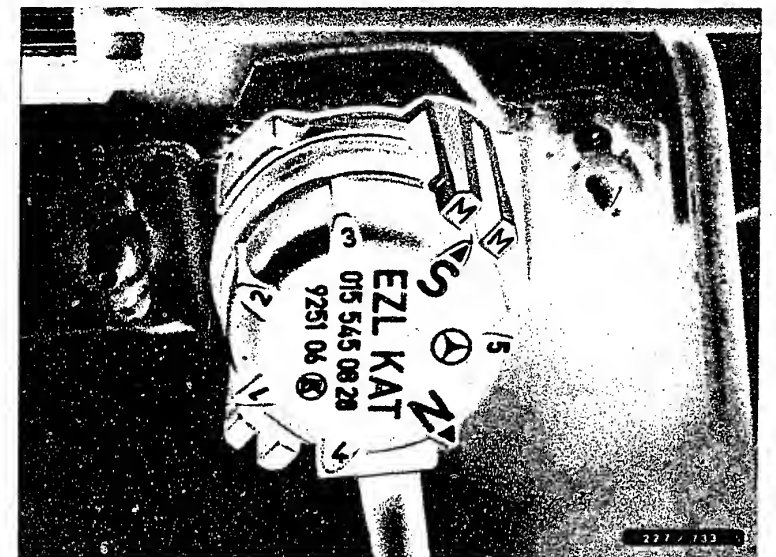
In the case of poor-quality premium fuel, set adjustment plug
(see bottom picture/top picture) to position "5".

Ignition timing is RETARDED by 3°.



Adjustment plug position "4"
(Picture shows position "6")
e.g. vehicle type 124

Adjustment plug position "S"
e.g. vehicle type 124



B1

Important vehicle information

Mercedes-Benz



B2

Important vehicle information

Mercedes-Benz



3.2 Ignition timing for unleaded REGULAR FUEL

ADJUSTMENT PLUG with label EZL 1-7

(White code colour) in position "6". See top picture.

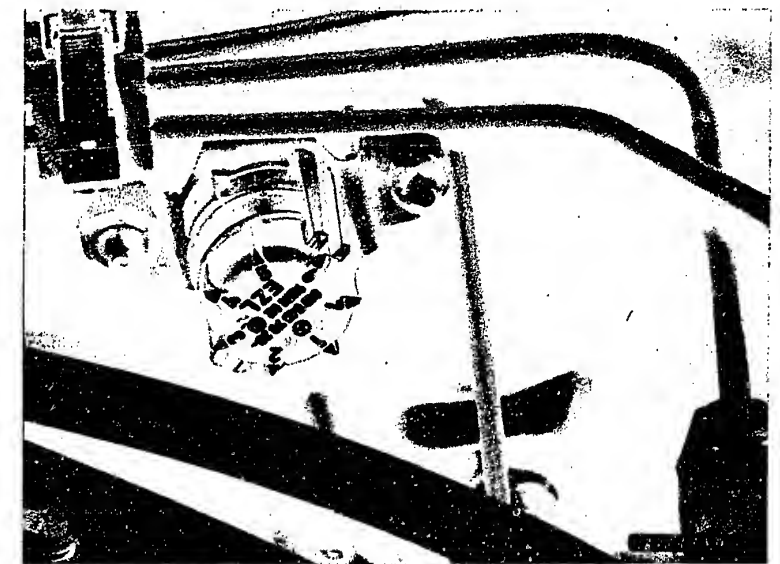
Note: This adjustment plug was installed only temporarily.
or

ADJUSTMENT PLUG with label EZL/KAT

(Green code colour) in position "N". See bottom picture.

Correction position for the workshop

In the case of poor-quality regular fuel, set adjustment plug
(see top picture/bottom picture) to position "7".



Adjustment plug position "6"
e.g. vehicle type 124

Adjustment plug position "N"
e.g. vehicle type 124



B3

Important vehicle information

Mercedes-Benz



B4

Important vehicle information

Mercedes-Benz



9. Trouble-shooting

9.1 How to use the trouble-shooting chart

The trouble-shooting chart starting on Coordinate C 3 contains customer complaint (fault symptom), cause of trouble, test instructions and coordinate references.

The possible cause of the fault should be selected from the trouble-shooting chart in accordance with the customer complaint (fault symptom).

If the cause of the fault is not clear, start testing with the detailed, self-contained trouble-shooting program beginning on Coordinate C 9.

If the cause of the fault is clear from the trouble-shooting chart, direct trouble-shooting is possible by going to the stated coordinate without having to perform the entire trouble-shooting program for each fault.

If there is no coordinate reference, trouble-shooting must be performed in accordance with the "Test instructions" column.

9.2 Procedure - trouble-shooting program

The trouble-shooting program starting on Coordinate C 9 is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The center row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and the explanations of the items in the picture.

If the questions asked in the left-hand row can be answered conclusively with "yes", then proceed to the next test down.

If the answer to the question is "no", branch to the center row and carry out the tests given there.

9.3 Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e. g. compression, valve clearance etc.). Ambient temperature/ignition system temperature 0° to 100° C (temperature has a considerable effect on measured values).

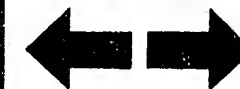
C1

Trouble-shooting
Mercedes-Benz



C2

Trouble-shooting
Mercedes-Benz



9.4 Trouble-shooting chart

Customer complaint (fault symptom)

1. Starting motor operates, but engine fails to start
2. Rough idling
3. Poor throttle response
4. Engine lacks power
5. Misfiring
6. Fuel consumption too high
7. Engine pings when accelerating
8. Backfiring
9. Engine becomes too hot

									Cause of fault	Test instructions	Coordinates
•	•	•	•	•	•	•	•	•	Unclear	Perform detailed trouble-shooting	C 9
•	•	•	•	•	•	•	•		Spark plugs defective	Assessment by means of ignition oscilloscope or visual examination of spark plug when removed	----
•	•	•	•	•					Shunt on secondary side	Evaluation of the ignition coil, high voltage distributor, ignition harness, and spark plug by means of the ignition oscillogram or a visual inspection	----
•	•	•	•	•					Open circuit on secondary side	Assessment of ignition coil, ignition distributor, ignition harness and spark plug by means of ignition oscilloscope, or continuity test with ohmmeter	----
•									Open circuit on primary side	--	D 13
•	•	•	•	•					Ignition coil defective	-	C 11
		•	•	•	•				Interference-suppression resistors defective	Assessment by means of ignition oscilloscope or resistance measurement	----

C3

Trouble-shooting chart

Mercedes-Benz



C4

Trouble-shooting chart

Mercedes-Benz



Trouble-shooting chart (continued)

Customer complaint (fault symptom)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

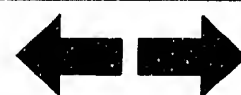
8. Backfiring

9. Engine becomes too hot

									<u>Cause of fault</u>	<u>Test instructions</u>	<u>Coordinates</u>
●							●		Incorrect firing sequence	1-3-4-2	---
●		●		●			●		Contact resistance/electronic-ignition control unit defective	---	C 13
●									Incorrect setting of high voltage distributor	---	C 15
			●		●	●		●	Pressure sensor not O.K.	---	C 17
			●		●				Coolant temperatur sensor not O.K.	---	C 19
			●		●	●			Incorrect timing angle	To prevent incorrect measurements, test <u>must</u> be performed as described on Coordinates given on right.	C17...C23
			●		●	●		●	Throttle-valve switch (idle contact) not O.K.		D 3

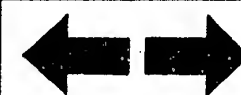
C5

Trouble-shooting chart
Mercedes-Benz



C6

Trouble-shooting chart
Mercedes-Benz



Trouble-shooting chart (continued)

Customer complaint (fault symptom)

1. Starting motor operates, engine fails to start
2. Rough idling
3. Poor throttle response (flat spot during acceleration)
4. Insufficient engine power
5. Misfiring
6. Fuel consumption too high
7. Engine pings when accelerating
8. Backfiring
9. Engine overheats

									<u>Cause of trouble</u>	<u>Test instructions</u>	<u>Coordinates</u>
				●					Electronic ignition control unit not O.K.	---	D 9
●									Pulse generator not O.K.	---	D 11
●									Voltage supply to electronic ignition control unit not O.K.	---	D 13

C7

Trouble-shooting chart

Mercedes-Benz



C8

Trouble-shooting chart

Mercedes-Benz



9.5 Trouble-shooting program

Test primary signal. If no oscilloscope or tachometer available, check whether ignition spark across spark gap.

Remove the protective cap from the ignition coil.

Primary signal testing with oscilloscope

Connect oscilloscope to ignition coil as per operating instructions.

Start engine.

Oscilloscope must indicate a primary voltage (of any value).

Primary signal testing with tachometer

Connect tachometer to ignition coil as per operating instructions.

Start engine.

Tachometer must indicate a reading (of any value).

Ignition spark testing with spark gap

Remove H.T. ignition cable terminal 4 from ignition coil.

Connect spark gap including sleeve-type suppressor

(5 k Ω) to ignition coil.

Adjust spark gap to 5 mm.

Start engine.

There must be sparks across the spark gap.

Primary signal present or ignition sparks across spark gap?

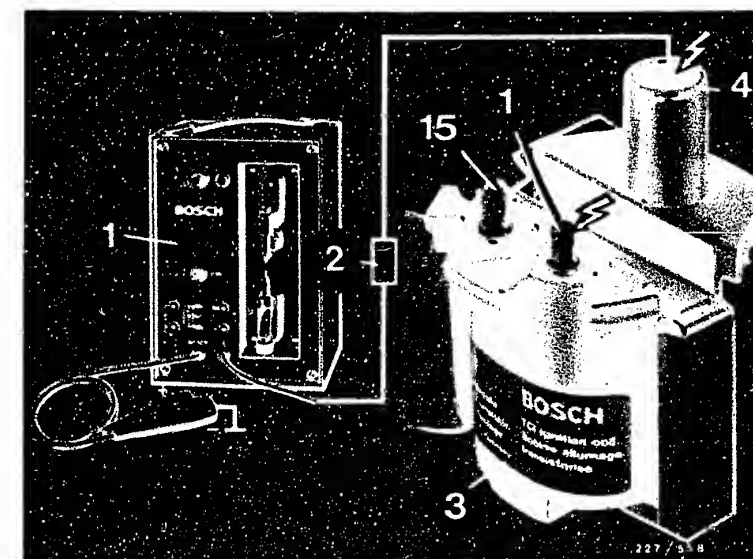
yes

Continued on C11/C12

no

If no primary signal or no ignition spark, continue testing at D11.

Tests from C11 onwards not necessary.



High voltage arrows:

Warning, 400 V ... 25 kV!

1 = Spark gap

2 = 5 k Ω sleeve-type suppressor

3 = ignition coil

C9

Trouble-shooting program

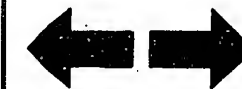
Mercedes-Benz

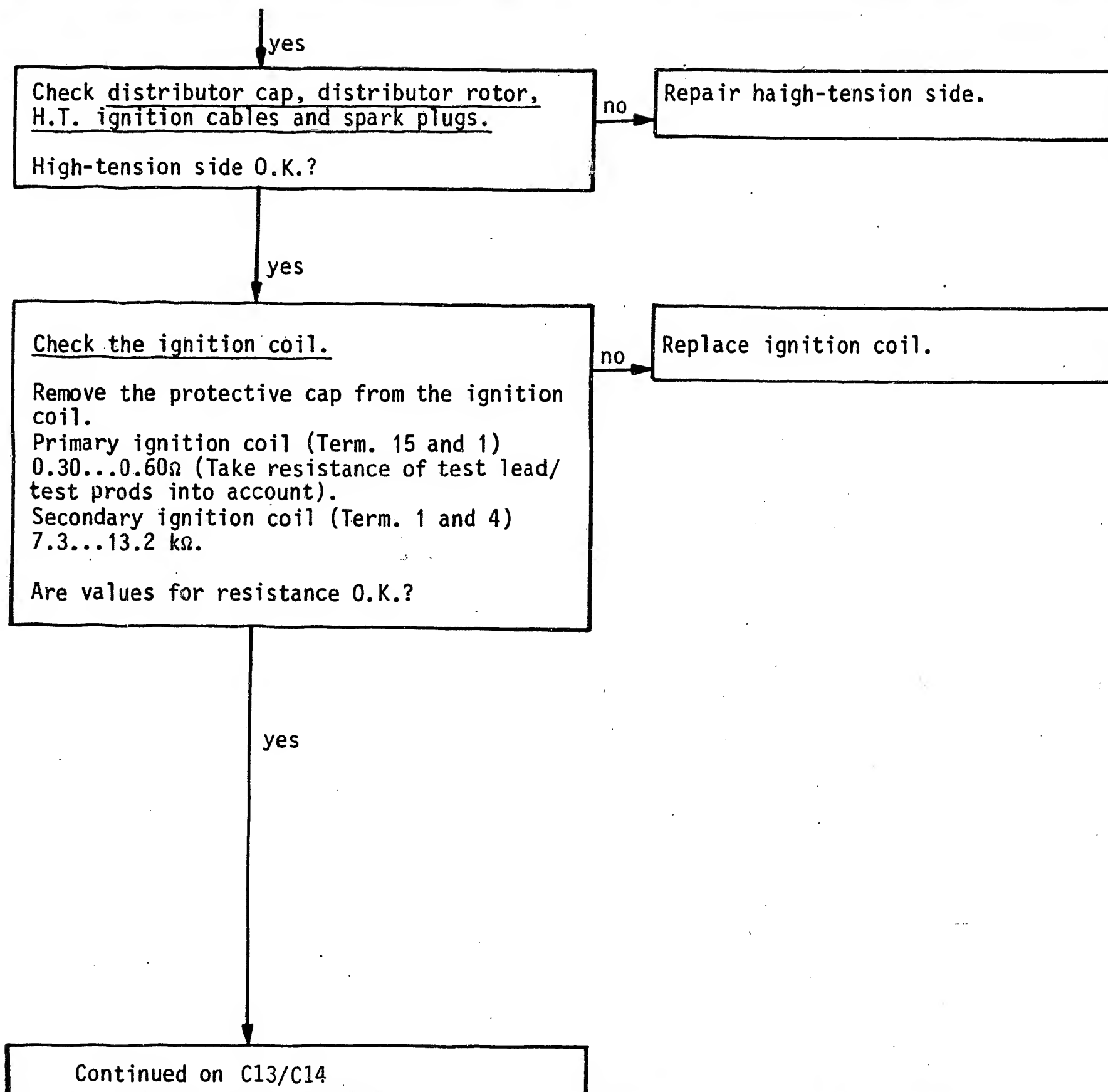


C10

Trouble-shooting program

Mercedes-Benz





High voltage arrows:
Warning, 400 V ... 25 kV!

C11

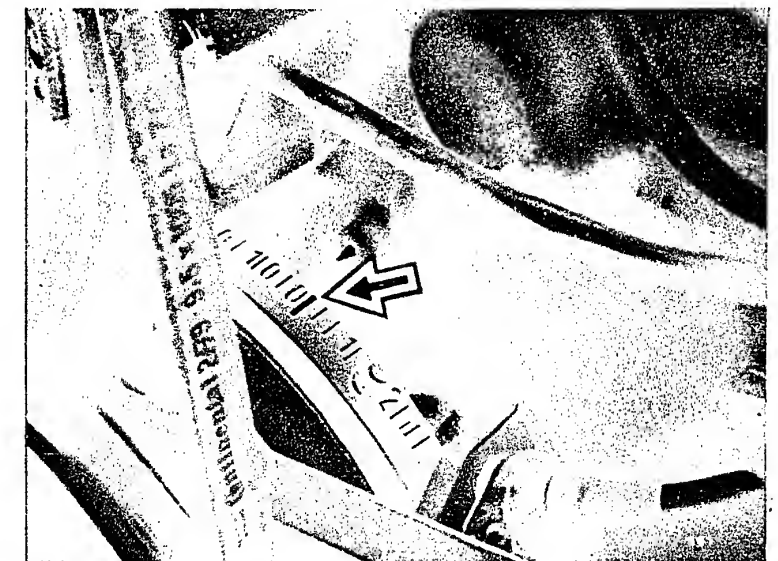
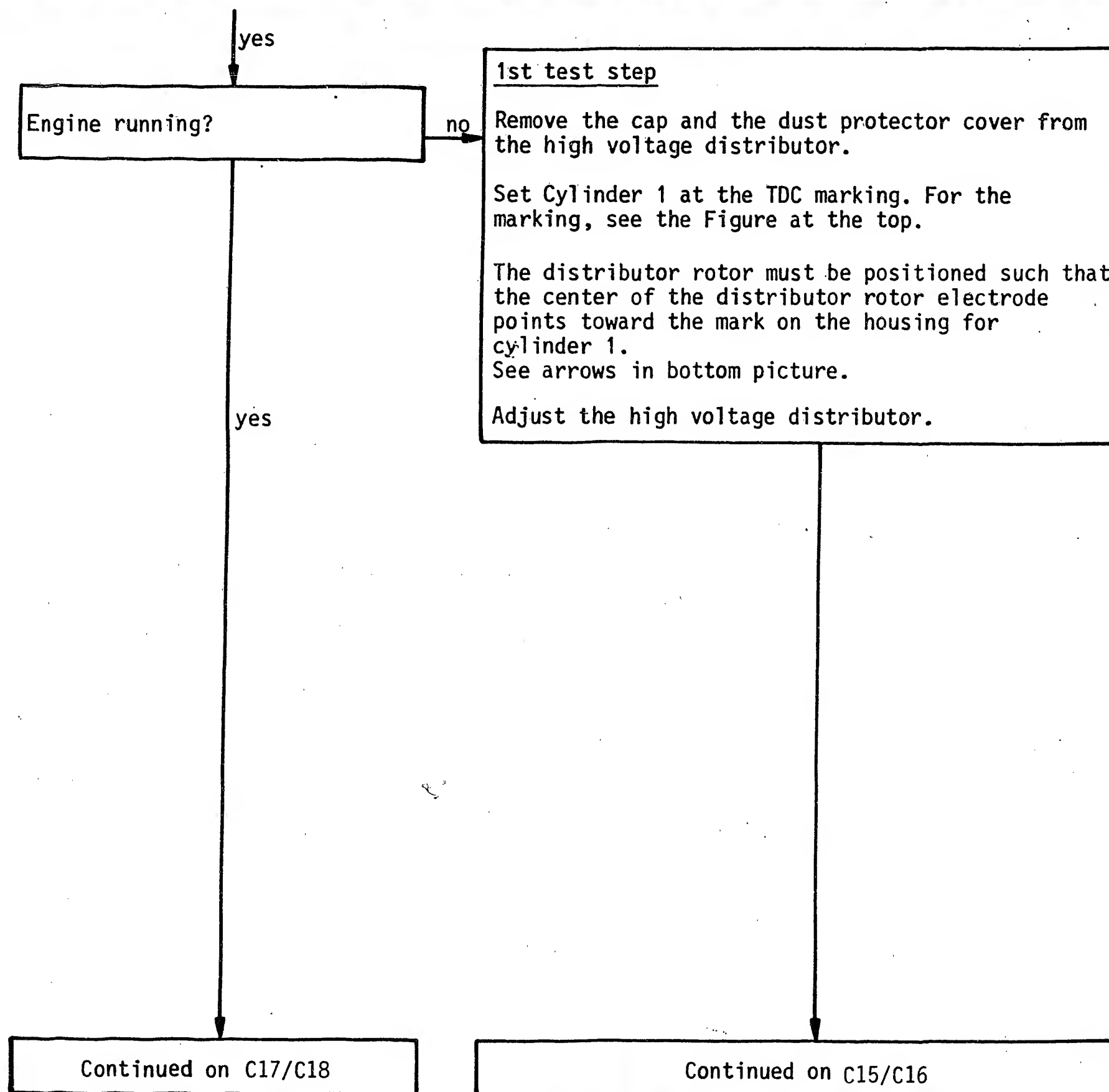
Trouble-shooting program
Mercedes-Benz



C12

Trouble-shooting program
Mercedes-Benz





Arrow=TDC marking



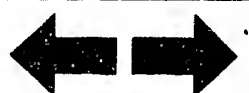
C13

Trouble-shooting program
Mercedes-Benz



C14

Trouble-shooting program
Mercedes-Benz



continued

2nd test step

Disconnect the negative and positive leads from the battery.

Disconnect the electronic ignition control unit plug. Switch the ignition on.

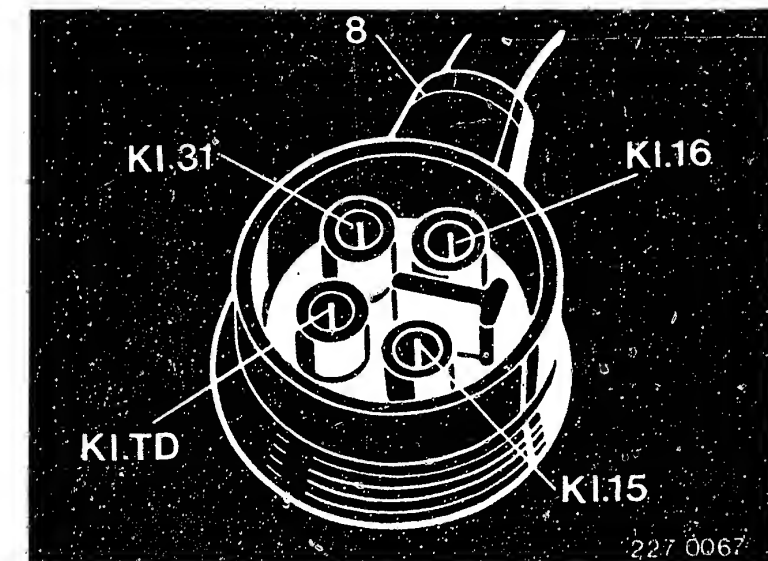
1. Check the leads from the positive battery terminal to the electronic ignition control unit plug Term. 15 and the leads from the negative battery terminal to the electronic ignition control unit plug Term. 31 for contact resistances. Max. total contact resistance 0.3Ω. (Take resistance of test lead into consideration). Eliminate contact resistances.

2. Check the leads from the positive battery terminal to the ignition coil Term. 15 and the lead from the ignition coil Term. 1 to the electronic ignition control unit plug Term. 16 for contact resistance. Max. total contact resistance 0.3 Ω. (Take the resistance of the test lead into consideration). Eliminate any contact resistance.

3. If test steps 1 and 2 were O.K., try installing the specified ignition coil. If engine not running, re-install "old" ignition coil and replace EI control unit.

yes

Continued on C17/C18



8=Electronic ignition control unit plug



yes

Check the pressure sensor

Connect the motortester to the diagnosis socket using an adapter cable. Disconnect the vacuum hose from the electronic ignition control unit. See the Figure at the top.

Take the plug connection from the throttle valve switch apart. See the Figure at the bottom. Run the engine at idle.

Take reading for timing angle.

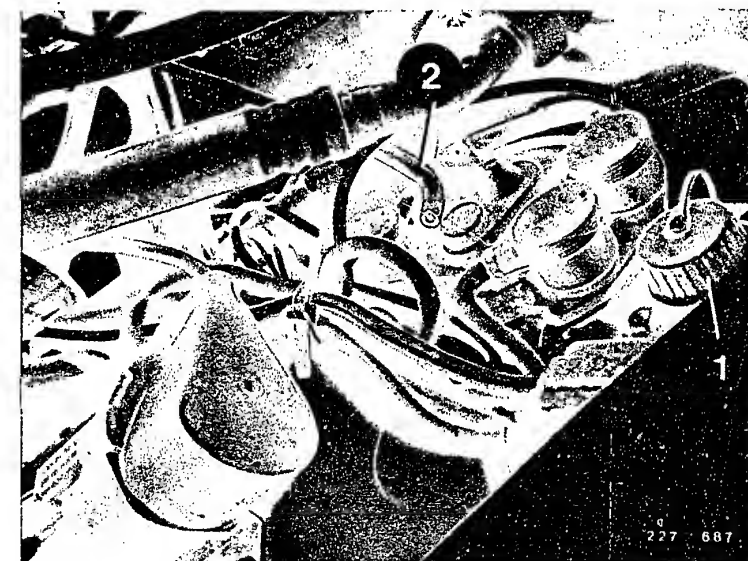
Put the vacuum hose back on the electronic ignition control unit. When this is done, the timing angle must change noticeably (in the direction "advance").

Did the timing angle change?

no

1. Check the vacuum hose from the electronic ignition control unit to the intake manifold plug connection for leaks. Eliminate any leaks.

2. If there was no leak, take out and replace the electronic ignition control unit.

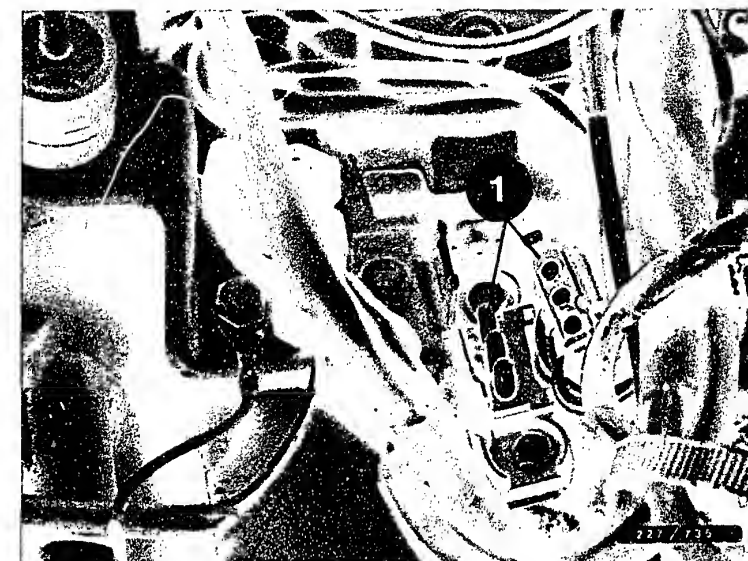


1=Diagnosis socket
2=Vacuum hose
e.g. vehicle type 124

yes

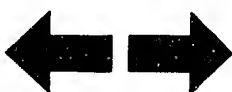
Continued on C19/C20

1=Plug connection from the throttle
valve switch



C17

Trouble-shooting program
Mercedes-Benz



C18

Trouble-shooting program
Mercedes-Benz



yes

Check the coolant temperature sensor.

Warm the engine up to normal operating temperature.
Connect the motortester to the diagnosis socket using an adapter lead.
Disconnect vacuum hose from electronic-ignition control unit (not shown).
Take apart throttle-valve switch plug connector (top picture Item 1).
Run the engine at 3200 min^{-1} . Take reading for timing angle.
Disconnect the coolant temperature sensor plug (color of cable green/black). See arrow in center picture).
When this is done, the timing angle must change.

Did the timing angle change?

no

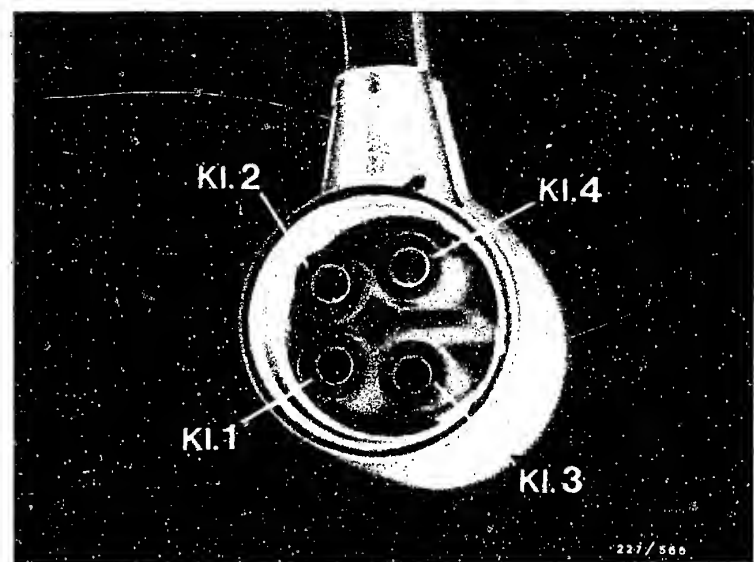
Switch the ignition off.
Disconnect the electronic ignition control plug and connect an ohmmeter to Term. 1 (see figure at bottom) and vehicle ground.
For resistances, see the table.

Coolant temperature		Resistance
+ 20°C	=	2.1...2.9 kΩ
+ 30°C	=	1.4...2.0 kΩ
+ 80°C	=	280...370 Ω
+ 90°C	=	210...280 Ω
+100°C	=	160...215 Ω

If the ohmmeter reads $\infty\Omega$, then check the lead from the coolant temperature sensor plug (color of cable green/black) to the electronic ignition control unit plug Term. 1 for continuity. Eliminate any break. If the values for resistance deviate, take out and replace the coolant temperature sensor.

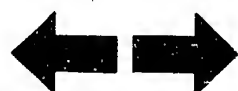
yes

Continued on C21/C22



C19

Trouble-shooting program
Mercedes-Benz



C20

Trouble-shooting program
Mercedes-Benz



yes

Check spark-advance angle.
Engine at normal operating temperature.
Motortester connected with adapter lead
to diagnostic socket.
Vacuum hose disconnected from EI control
unit. See top picture.
Throttle-valve switch plug connector
disconnected. See bottom picture.

Spark-advance angle specification for:
Vehicles with catalytic converter

Fuel	Adjustment plug EZ L (white)*	Adjustment plug EZ L-KAT (green)	Engine speed min ⁻¹ or ° CS BTDC
Premium unleaded	Position 4	Position S	3200 25-29°
Regular unleaded	Position 6	Position N	3200 19-23°

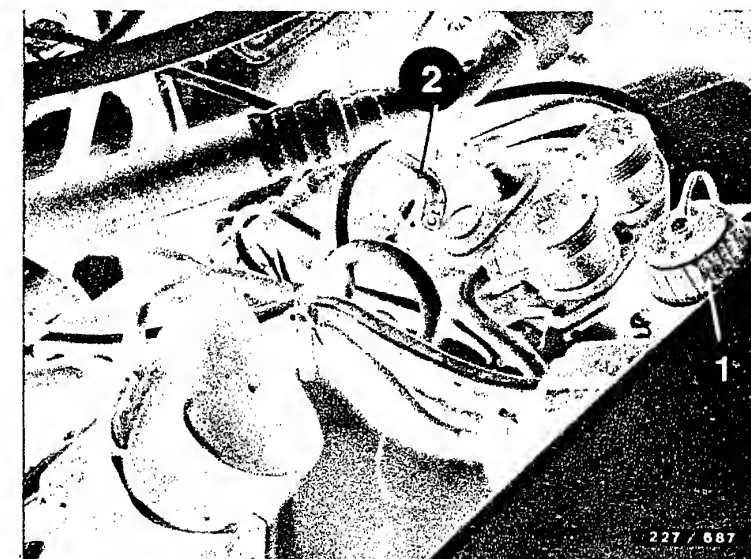
*Adjustment plug was installed only temporarily

yes

Continued on C23/C24

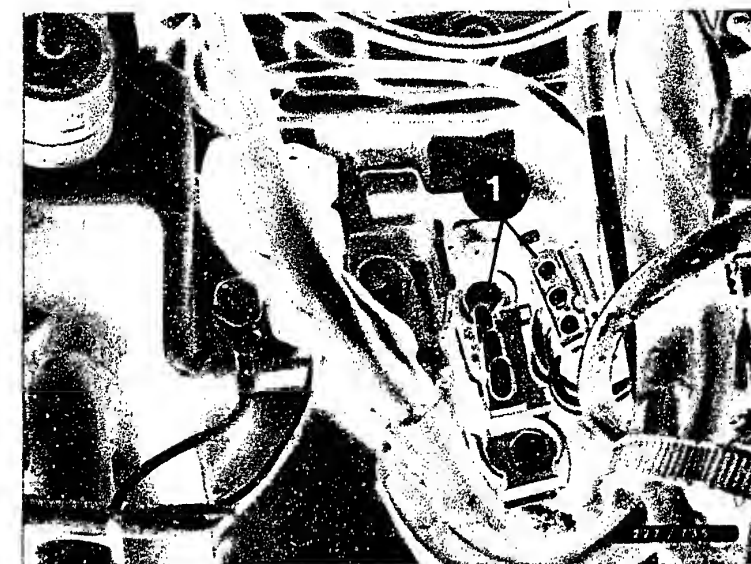
C21

Trouble-shooting program
Mercedes-Benz



1 = Diagnostic socket
2 = Vacuum hose
e.g. vehicle type 124

1 = Throttle-valve switch
plug connector



C22

Trouble-shooting program
Mercedes-Benz



Continued

Vehicles WITHOUT catalytic converter			
Fuel	Adjustment plug EZ L (white)*	Adjustment plug EZL-ECE (green)	Engine speed min ⁻¹ or ° CS BTDC
Premium unleaded/leaded	Position 1	Position S	3200 25-29°
Regular unleaded/leaded	Position 3	Position N	3200 19-23°
*Adjustment plug was installed only temporarily			
Spark-advance angle O.K. as per table?			

yes

Continued on D3/D4

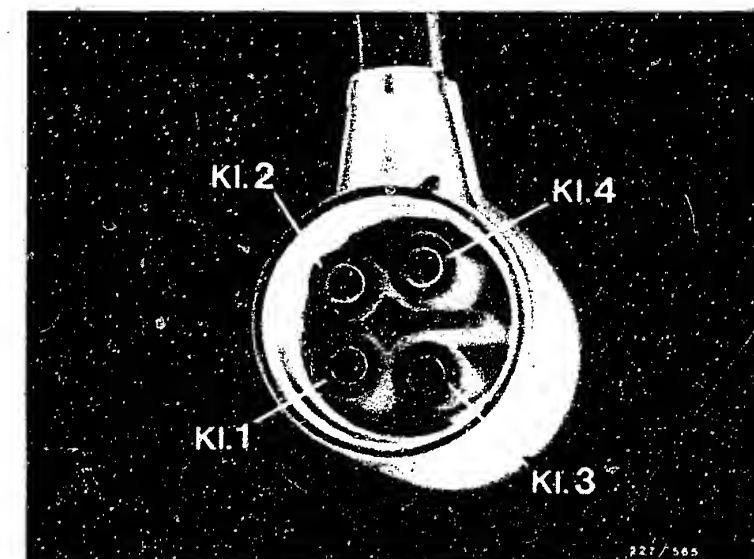
no

Switch off ignition. Disconnect EI control-unit plug. See top picture. Connect ohmmeter to term. 3 and vehicle ground. Set adjustment plug to positions 2 to 7 one after the other. See table for resistance values.
Note: The resistance network of all adjustment plugs is identical. The adjustment plugs differ only by the stamp EZL (white), EZL-ECE (white) and EZL-KAT (green). See bottom picture.

Adjustment-plug position Resistance values

EZL	EZL-ECE	EZL-KAT		
1	S	1	=	∞ Ω
2	2	2	=	2.4 kΩ
3	N	3	=	1.3 kΩ
4	4	S	=	750 Ω
5	5	5	=	470 Ω
6	6	N	=	220 Ω
7	7	7	=	0 Ω

Continued on D1/D2



EI = Control unit plug

Adjustment plug (e.g. EZL-ECE) e.g. vehicle type 124



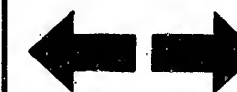
C23

Trouble-shooting program
Mercedes-Benz



C24

Trouble-shooting program
Mercedes-Benz

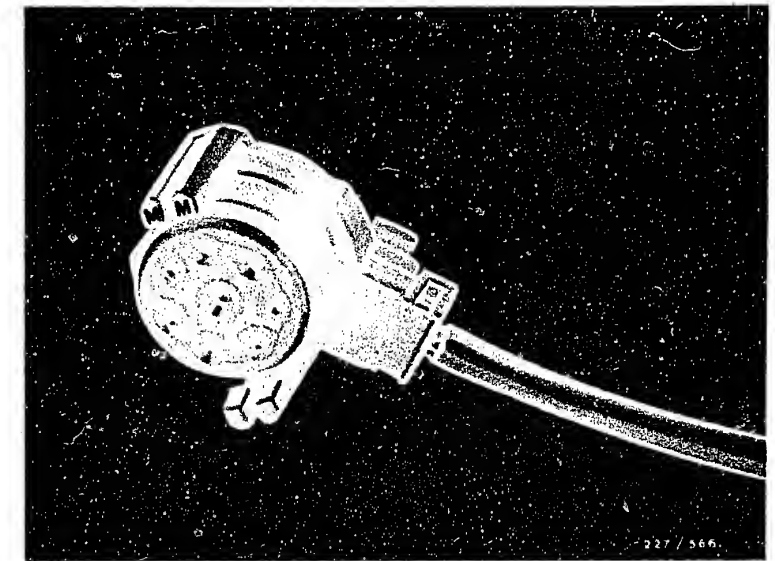


Continued

If resistance was O.K. in all 6 trimming-plug positions, replace electronic-ignition control unit.

If resistance was approx. $0\ \Omega$ or $\infty\ \Omega$ in all 6 trimming-plug positions, replace trimming-plug housing without trimming plug. See top picture.

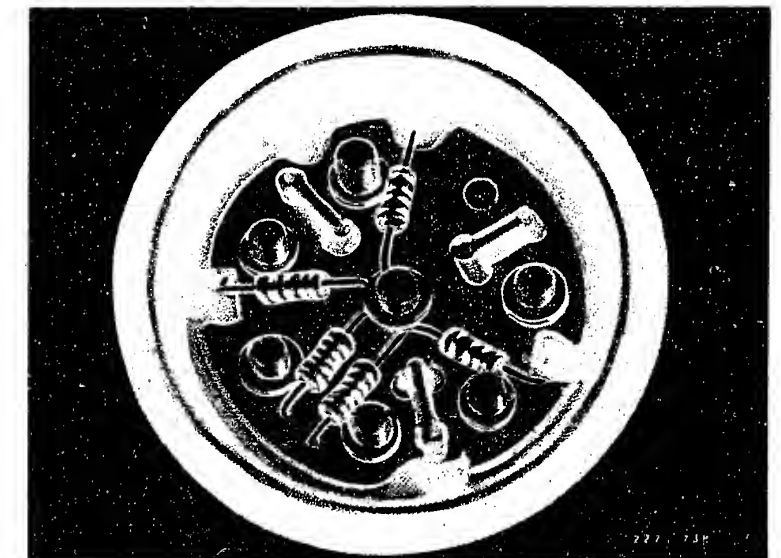
If resistance was not within tolerance, replace trimming plug. See bottom picture.



Trimming-plug housing

yes

Adjustment plug (from rear)



Continued on D3/D4

D1

Trouble-shooting program
Mercedes-Benz



D2

Trouble-shooting program
Mercedes-Benz



↓ yes

Check throttle-valve switch idle contact. Switch off ignition. Disconnect KE-Jetronic control-unit plug (not shown). Disconnect electronic-ignition control-unit plug and connect ohmmeter to term. 2 and vehicle ground. See top picture. Throttle-valve switch plug connector connected. Throttle valve is in idle position. Ohmmeter must indicate approx. $0\ \Omega$ (continuity). Open throttle valve. Ohmmeter must indicate $\infty\ \Omega$.

Resistance O.K.?

no

1. Disconnect the plug connection from the throttle valve switch. See the Figure at the center. Connect an ohmmeter one after the other to:

Throttle valve
switch plug
connection
(Center picture)

Electronic
ignition control
unit plug

Term. 1 and
Term. 2 and

Term. 2
vehicle ground

The ohmmeter must read approx. $0\ \Omega$ (continuity). Eliminate any break.

2. Connect the ohmmeter to the throttle valve switch plug connection Term. 1 and Term. 2. See the Figure at the bottom. The throttle valve is closed. Resistance approx. $0\ \Omega$

Open the throttle valve. The ohmmeter must read $\infty\ \Omega$.

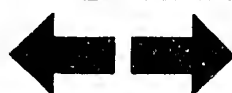
If resistance not O.K., replace throttle-valve switch.

yes

Continued on D5/D6

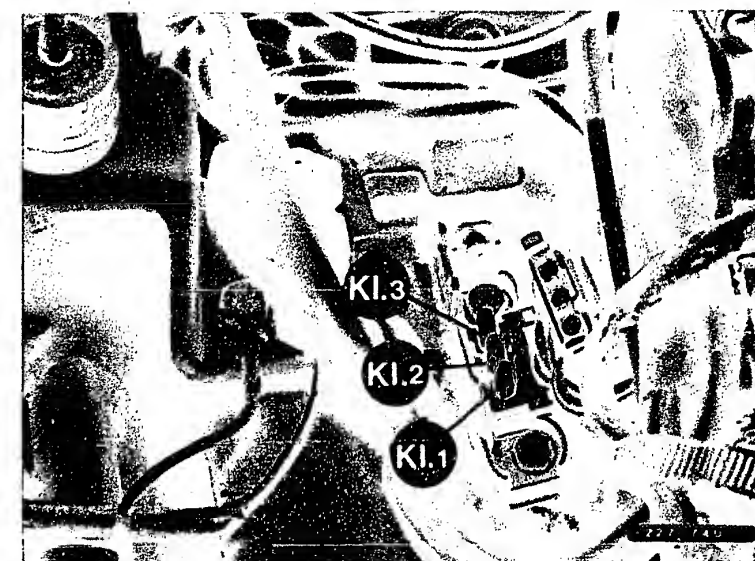
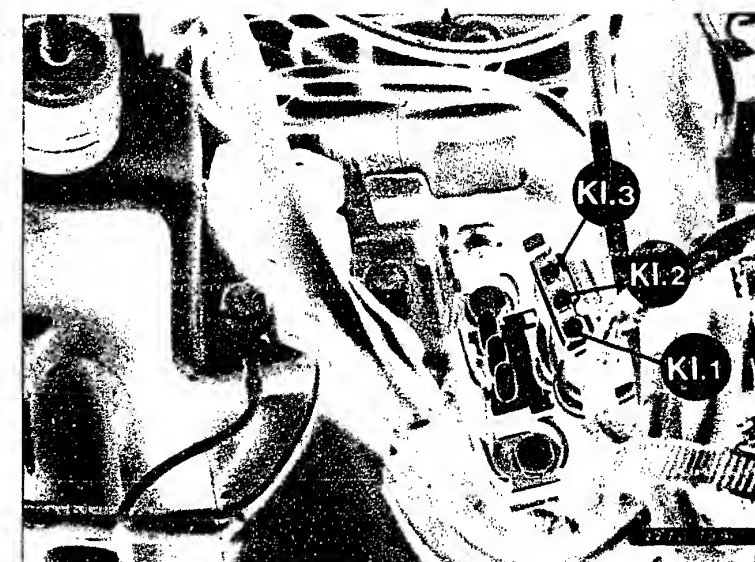
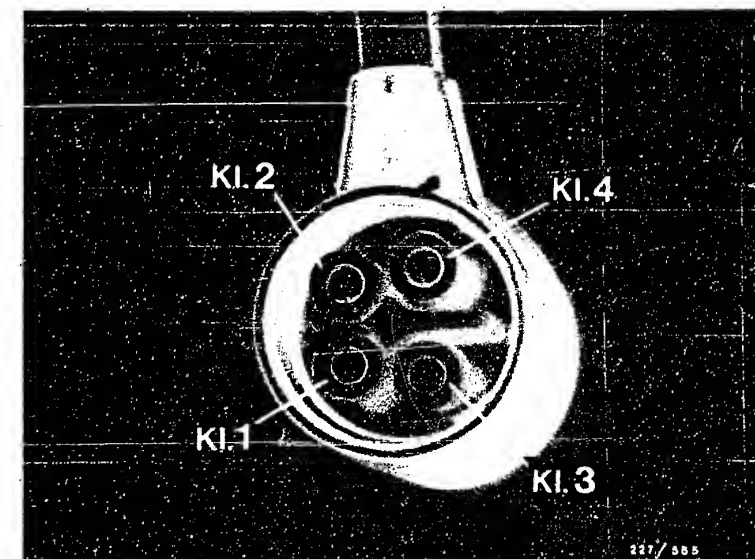
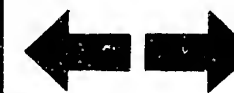
D3

Trouble-shooting program
Mercedes-Benz



D4

Trouble-shooting program
Mercedes-Benz



yes

Check the voltage supply to the electronic ignition control unit and the ignition coil.

Connect the voltmeter and test prod to the diagnosis socket Term. 5 (+) and the battery terminal (-). See the Figure.

Run the engine at idle.

The voltage measured must be 12 ... 14 V and must not be more than 1 V less than battery voltage.

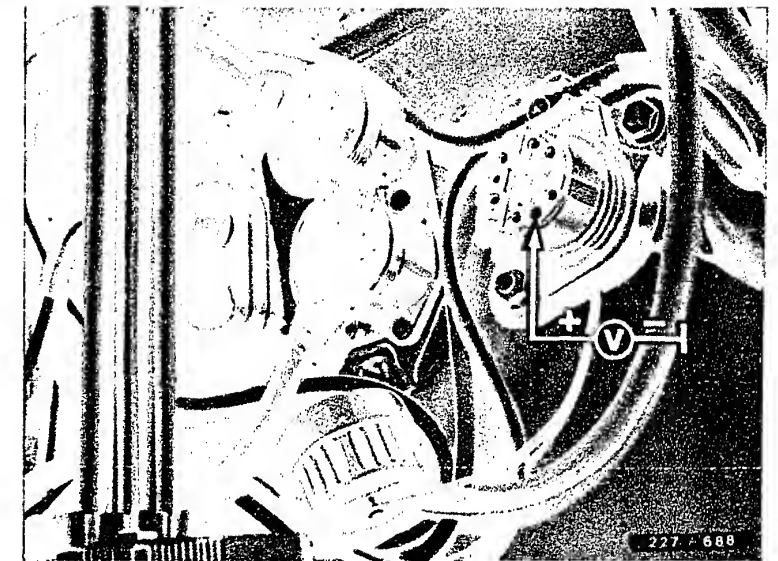
Is the value for voltage O.K.?

no

Disconnect the positive lead from the battery. Switch the ignition on. Check the leads from the positive battery terminal to the ignition coil Term. 15 for contact resistance.

Max. contact resistance 0.3 Ω .
(Take the resistance of the test lead and the test prods into consideration.)

Eliminate any contact resistance.



Diagnosis socket
e.g. vehicle type 124

yes

Continued on D7/D8

D5

Trouble-shooting program
Mercedes-Benz



D6

Trouble-shooting program
Mercedes-Benz

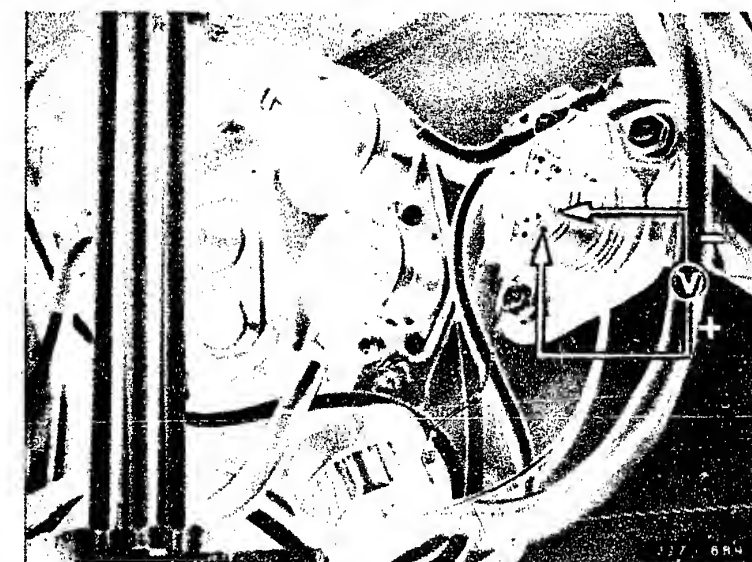


yes

Check peak-coil-current cut-off.
Connect voltmeter with test prods to diagnostic socket term. 5 (+) and term. 4 (-).
Switch the ignition on. For approx. 1 sec. the voltmeter can move a short distance.
The voltmeter must return to 0 V.
Is the value for voltage (0 V) O.K.?

no

Take out and replace the electronic ignition control unit and the ignition coil.



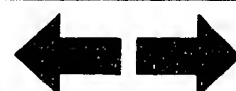
Diagnosis socket
e.g. vehicle type 124

yes

Continued on D9/D10

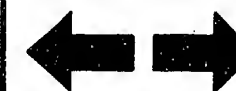
D7

Trouble-shooting program
Mercedes-Benz



D8

Trouble-shooting program
Mercedes-Benz



yes

Test primary voltage.
(If MOT series available).
Connect oscilloscope (e.g. MOT 201) together
with pulse shaper 1 684 463 154 to ignition
coil according to operatin instructions.
Note: Incorrect reading without pulse shaper.
Allow engine to idle.
Measured primary voltage must be 280-360 V.
See graph.

Voltage correct?

yes

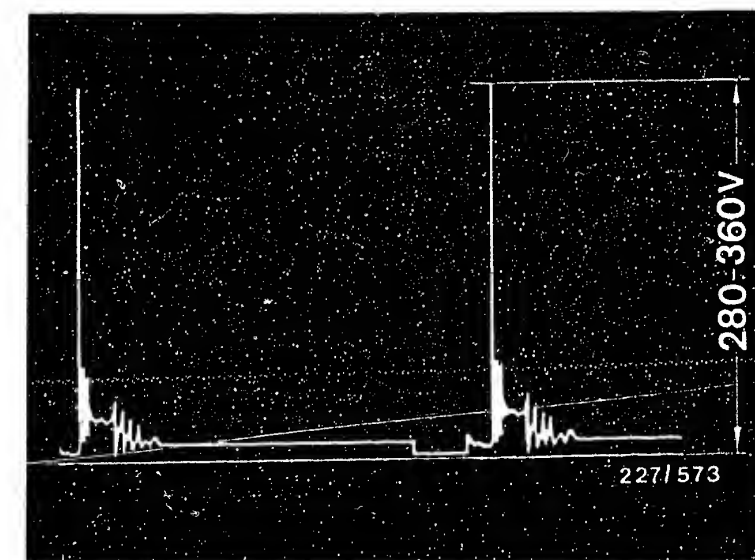
If all test steps were O.K. and customer
complaint still not remedied, try installing
the specified ignition coil.
If customer complaint still not remedied, re-
install "old" ignition coil.
Ignition system O.K.
Testing completed.
Tests starting on D11 not necessary.

Note:

Further possible faults on fuel system or
engine not mechanically O.K.

no

Take out and replace the electronic
ignition control unit.



D9

Trouble-shooting program

Mercedes-Benz



D10

Trouble-shooting program

Mercedes-Benz



No primary voltage or no ignition spark.

(Continued from C9/C10).

yes

Check insulation of pulse generator.

Disconnect E1 control-unit plug and connect ohmmeter to term. 7 and battery.

See top picture.

Ohmmeter must indicate $\infty \Omega$.

Resistance value O.K.?

no

If the value for resistance is approx. 0Ω , take out and replace the pulse generator. See the Figure at the bottom.

yes

Check the internal resistance of the pulse generator.

Disconnect the electronic ignition control unit plug and connect an ohmmeter to Term. 7 and Term. 31d. See the Figure at the top.

The ohmmeter must read

680 ... 1200 Ω .

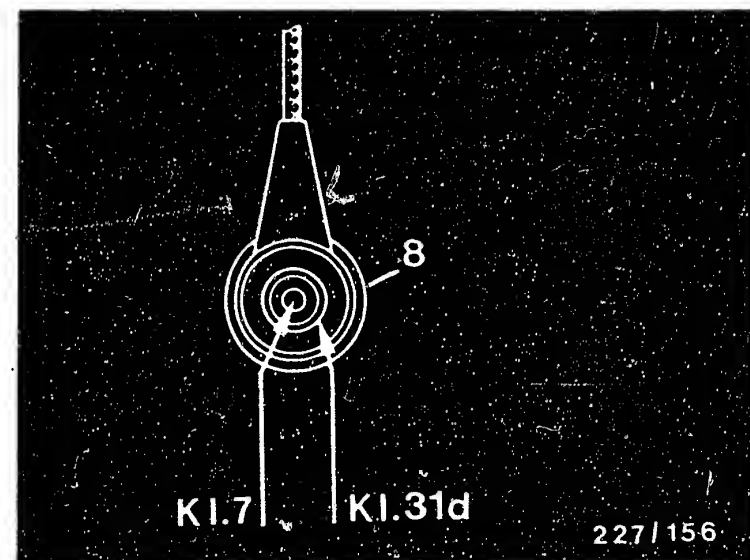
Is the value for resistance O.K.?

no

Take out and replace the pulse generator. See the Figure at the bottom.

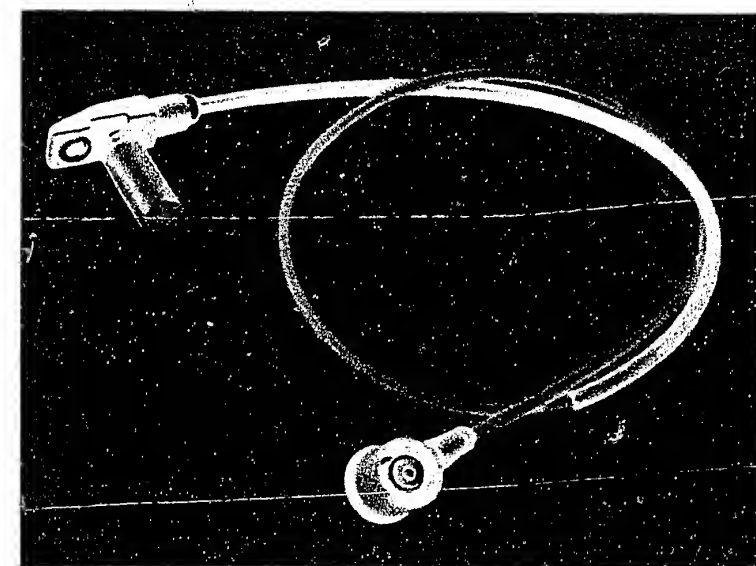
yes

Continued on D13/D14



8=Electronic ignition control unit plug - pulse generator

Pulse generator



D11

Trouble-shooting program

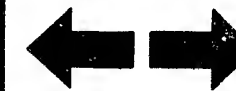
Mercedes-Benz

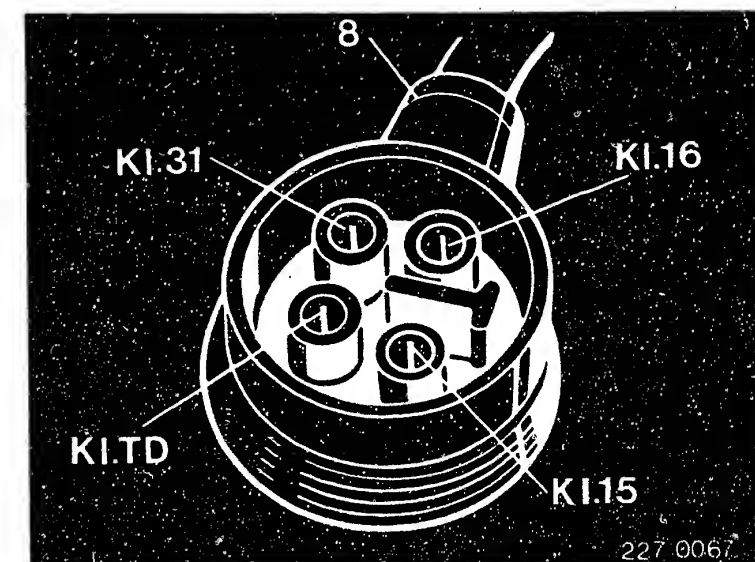
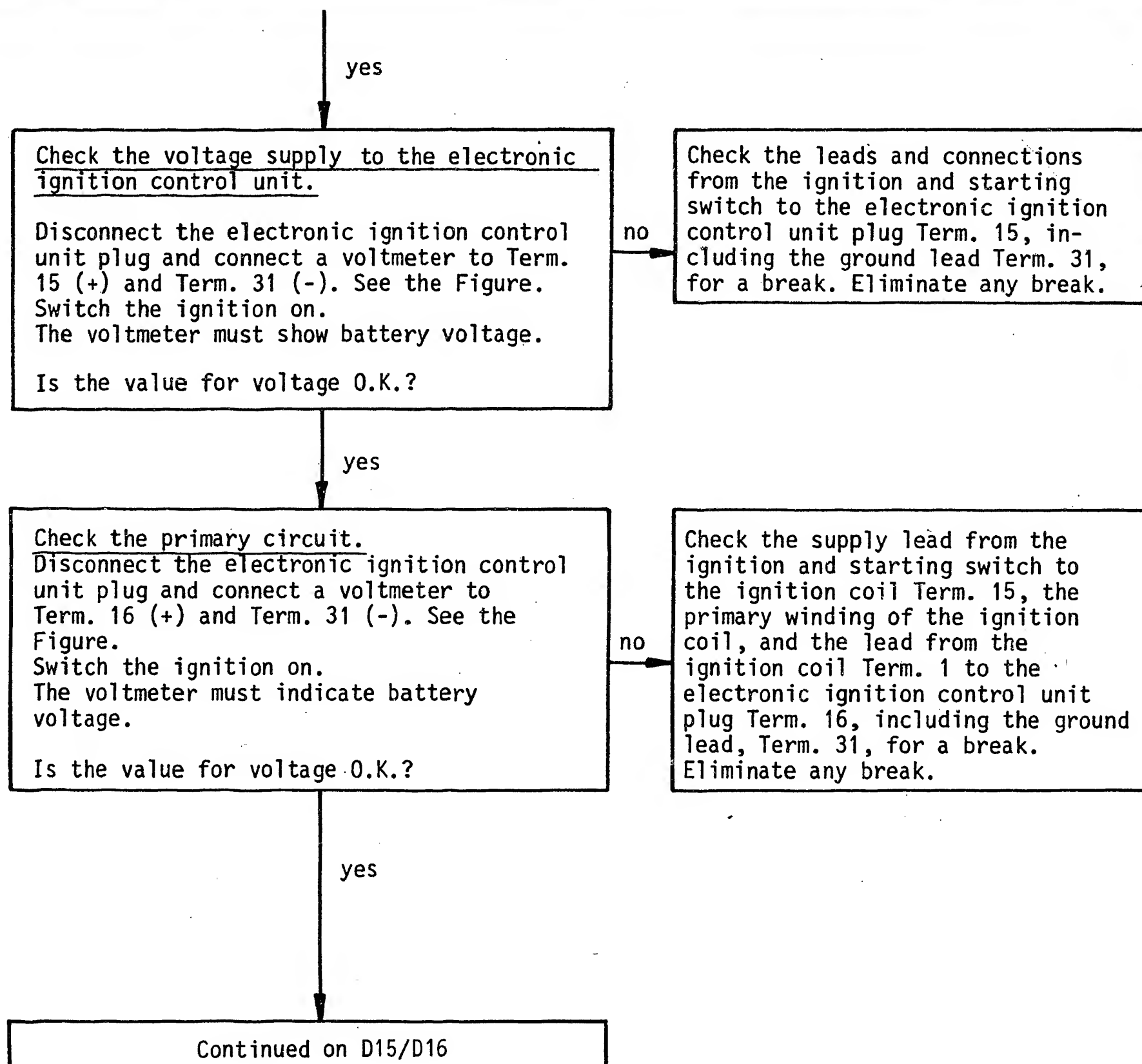


D12

Trouble-shooting program

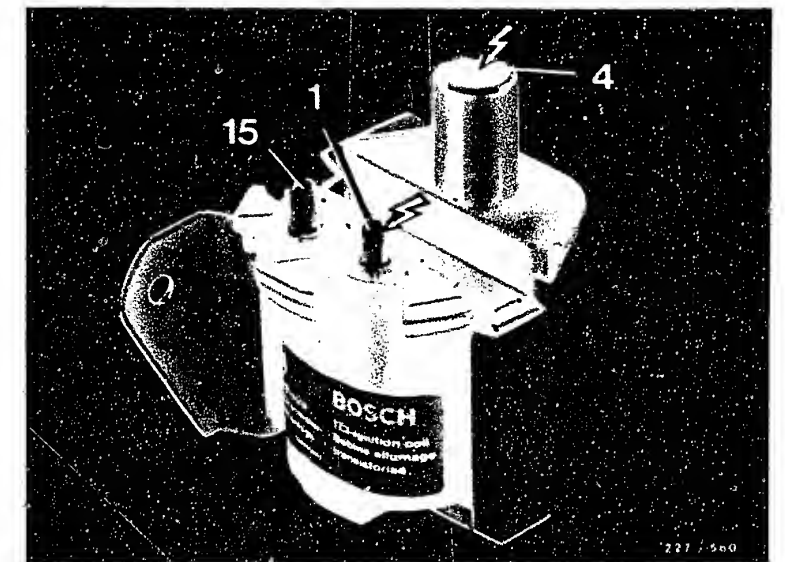
Mercedes-Benz



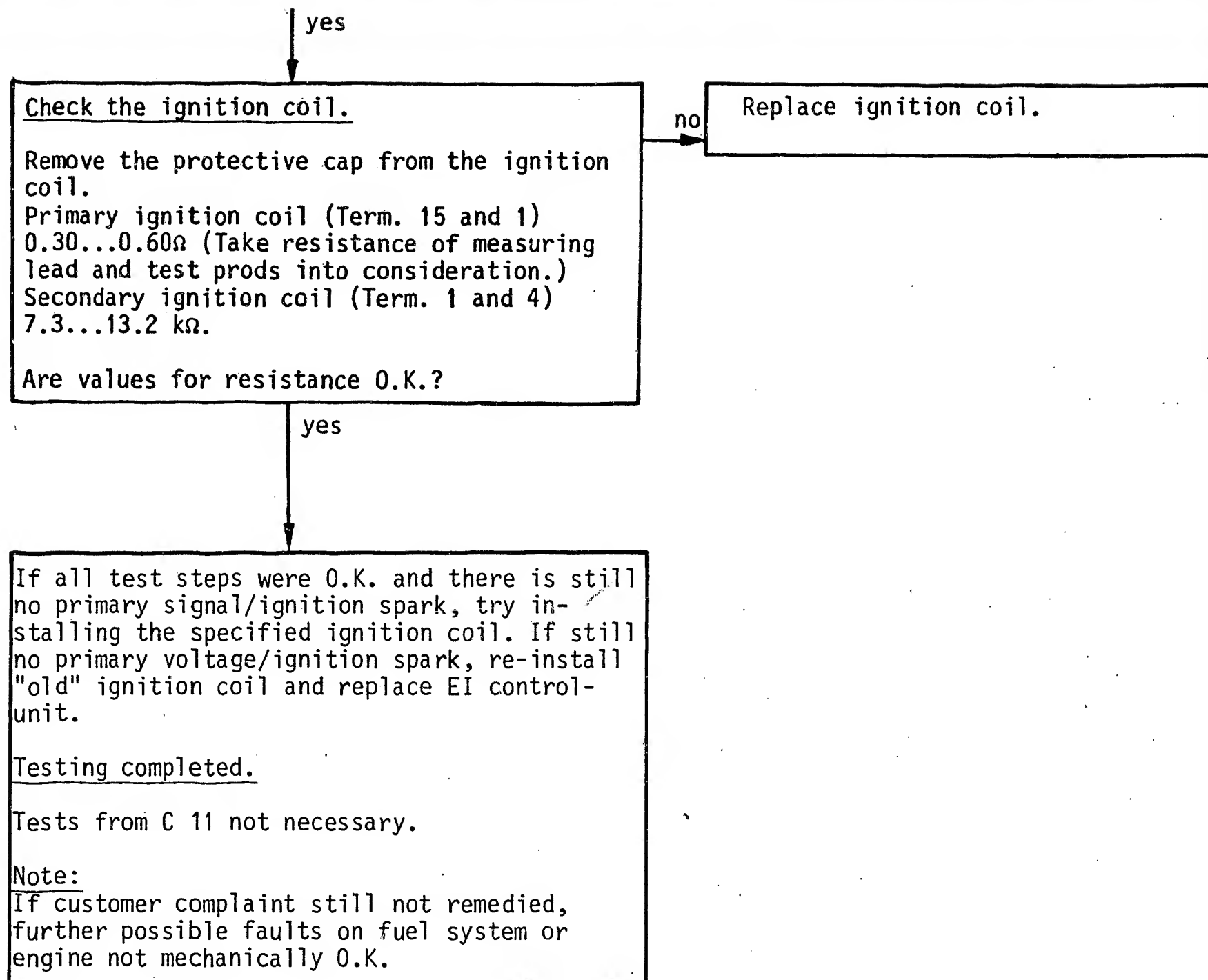


8=Electronic ignition control unit plug

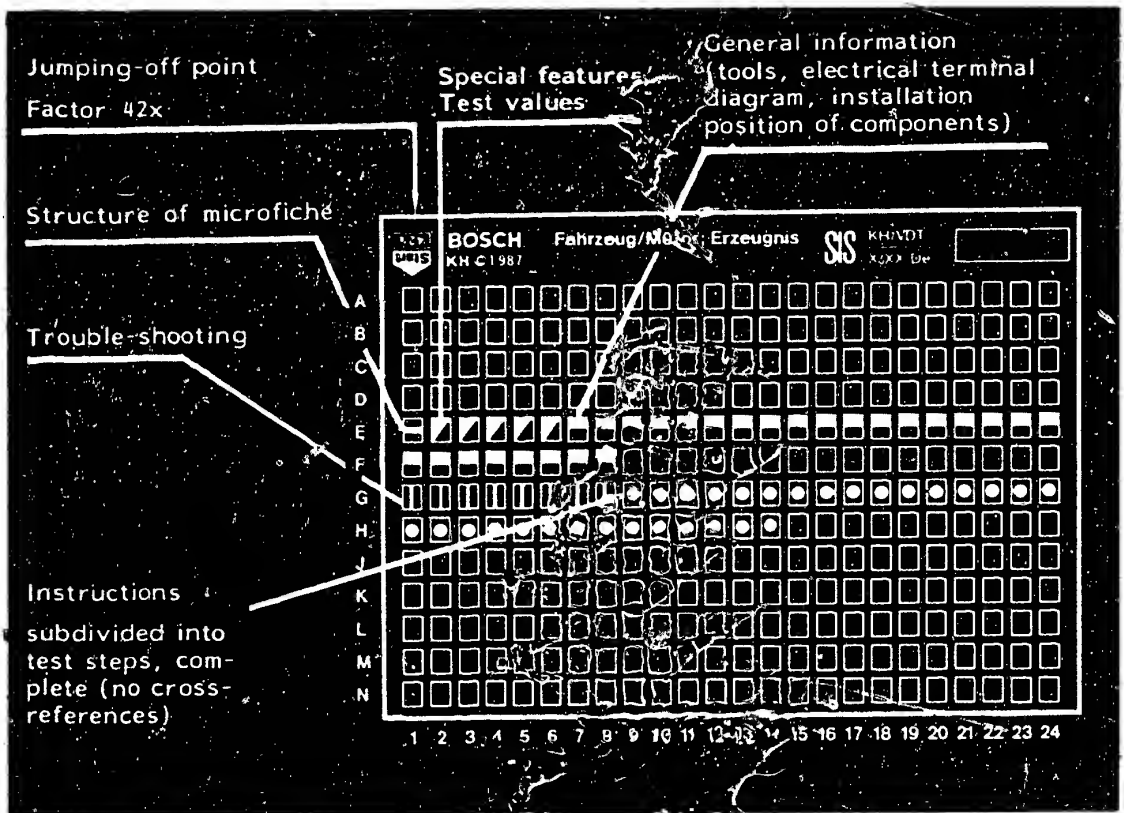




High voltage arrows:
Warning, 400 V ... 25 kV!



Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

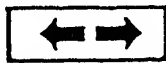
E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

E1	Trouble-shooting program	↓
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1. Special features

Mercedes-Benz 260E, SE 6-cyl. engine 103.940/941

1985 model year world-wide except USA, J, AUS

Mercedes-Benz 300E, SE, SL 6-cyl. engine

103.983/981/982

1985 model year world-wide except USA, J, AUS.

Equipped with:

Control unit 0 227 400 5.. (with current limitation)
or

Siemens co. control unit

(Daimler-Benz AG service part)

Note: Bosch and Siemens control units are
interchangeable.

Ignition coil 0 221 5..

2. Test specifications

Primary ignition coil
Secondary ignition coil

0.3 ... 0.6 Ω
7.3 ... 13.2 k Ω

G11

Coolant-temperature
sensor

+ 20°C	2.1 ... 2.9 k Ω
+ 30°C	1.4 ... 2.0 k Ω
+ 80°C	280 ... 370 Ω
+ 90°C	210 ... 280 Ω
+ 100°C	160 ... 215 Ω

G17

E2

Special features/test specifications

Mercedes-Benz



Spark advance without vacuum

260E, 260 SE

Vehicles WITH catalytic converter

Fuel	Adjustment plug EZL KAT (green)	Engine speed, min^{-1} / °CS BTDC
Premium lead-free	Position S	3200 25 - 29°
Regular lead-free	Position N	3200 19 - 23°

Vehicles WITHOUT catalytic converter

Fuel	Adjustment plug EZL ECE (white)	Engine speed, min^{-1} / °CS BTDC
Premium leaded/ lead-free	Position S	3200 25 - 29°
Regular leaded/ lead-free	Position N	3200 19 - 23°

In order to prevent incorrect measurement results,
always carry out testing per coordinate information.

G 15



C 21

E3

Test specifications

Mercedes-Benz



Spark advance without vacuum

300E, 300 SE, 300SL

Vehicles WITH catalytic converter

Fuel	Adjustment plug EZL KAT (green)	Engine speed, min ⁻¹ / °CS BTDC
Premium lead-free	Position S	3200 27 - 31°
Regular lead-free	Position N	3200 21 - 25°

Vehicles WITHOUT catalytic converter

Fuel	Adjustment plug EZL ECE (white)	Engine speed, min ⁻¹ / °CS BTDC
Premium leaded/ lead-free	Position S	3200 27 - 31° * 29 ^A - 33°
Regular leaded/ lead-free	Position N	3200 21 - 25° * 23 - 27°

* Only Sweden/Switzerland

In order to prevent incorrect measurement results,
always carry out testing per coordinate information.

G15



G21

E4

Test specifications

Mercedes-Benz



Adjustment-plug position
for version

* Code color: white

** Code color: green

ECE*	KAT**
S	1 = $\infty \Omega$
2	2 = 2.4 k Ω
N	3 = 1.3 k Ω
4	S = 750 Ω
5	5 = 470 Ω
6	N = 220 Ω
7	7 = 0 Ω

G21

E5

Test specifications

Mercedes-Benz



Electronic-ignition control 12 ... 14 V
unit power supply max. 1 V
and ignition coil with below V_B
engine idling

H3

Primary voltage 280 ... 360 V
with engine idling

H7

Internal resistance of 680 ... 1200 Ω
pulse generator

H9

Pulse-generator $\infty \Omega$
isolation

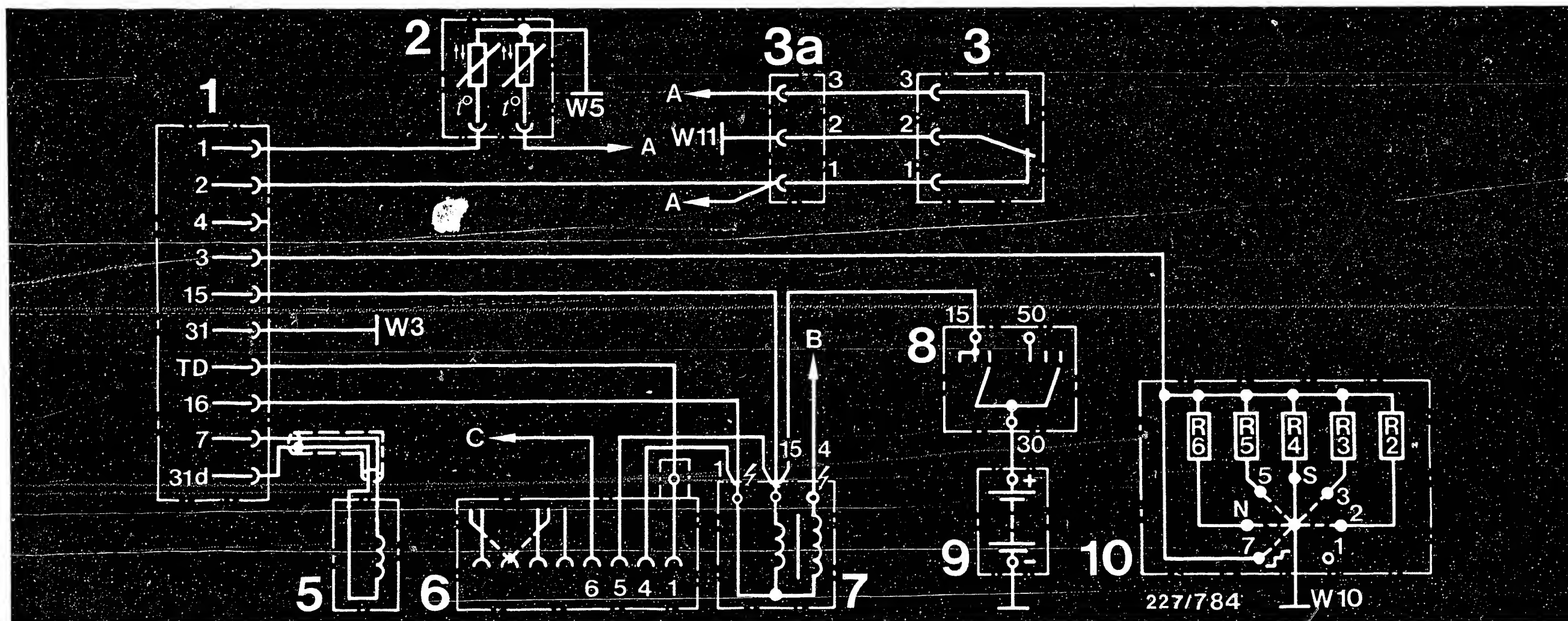
See Autodata test specifications for settings for
idle speed, exhaust etc.

E6

Test specifications

Mercedes-Benz





Danger arrows:
Warning: 400 V ... 25 kV

- 1 = Electronic-ignition control unit
- 2 = Coolant temperature sensor (double NTC)
- 3 = Throttle-valve switch
- 3a = Throttle-valve switch plug connector

- 5 = Pulse generator
 - 6 = Diagnostic socket
 - 7 = Ignition coil
 - 8 = Ignition/starting switch
 - 9 = Battery
 - 10 = Trimming plug
- Legend e.g for
EVL-KAT

- A = to KE-Jetronic control unit
- B = to high-voltage distributor
- C = Plug connector engine term. 30

- W 3 = Ground, wheel housing front left (ignition coil)
- W 5 = Ground, engine
- W10 = Ground, battery
- W11 = Ground, engine (electric lead screwed on)

3. Electrical terminal diagram

E7

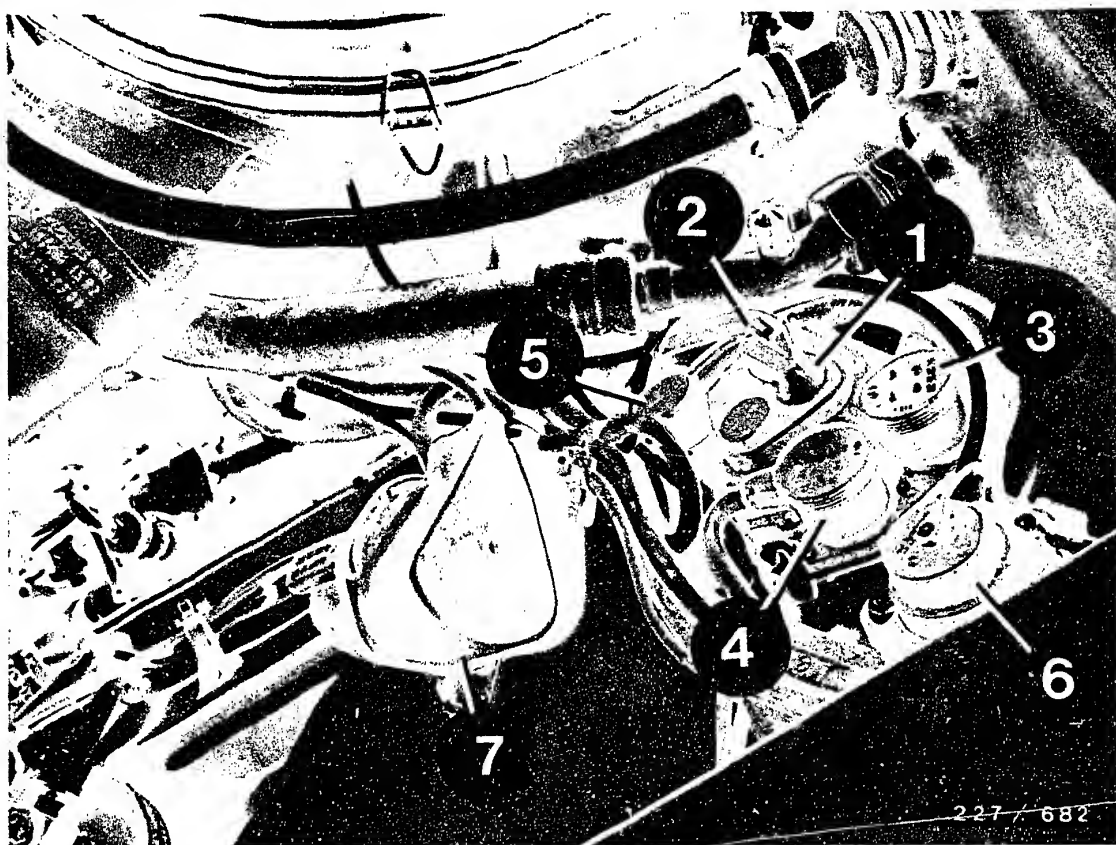
Electrical terminal diagram
Mercedes-Benz



E8

Electrical terminal diagram
Mercedes-Benz



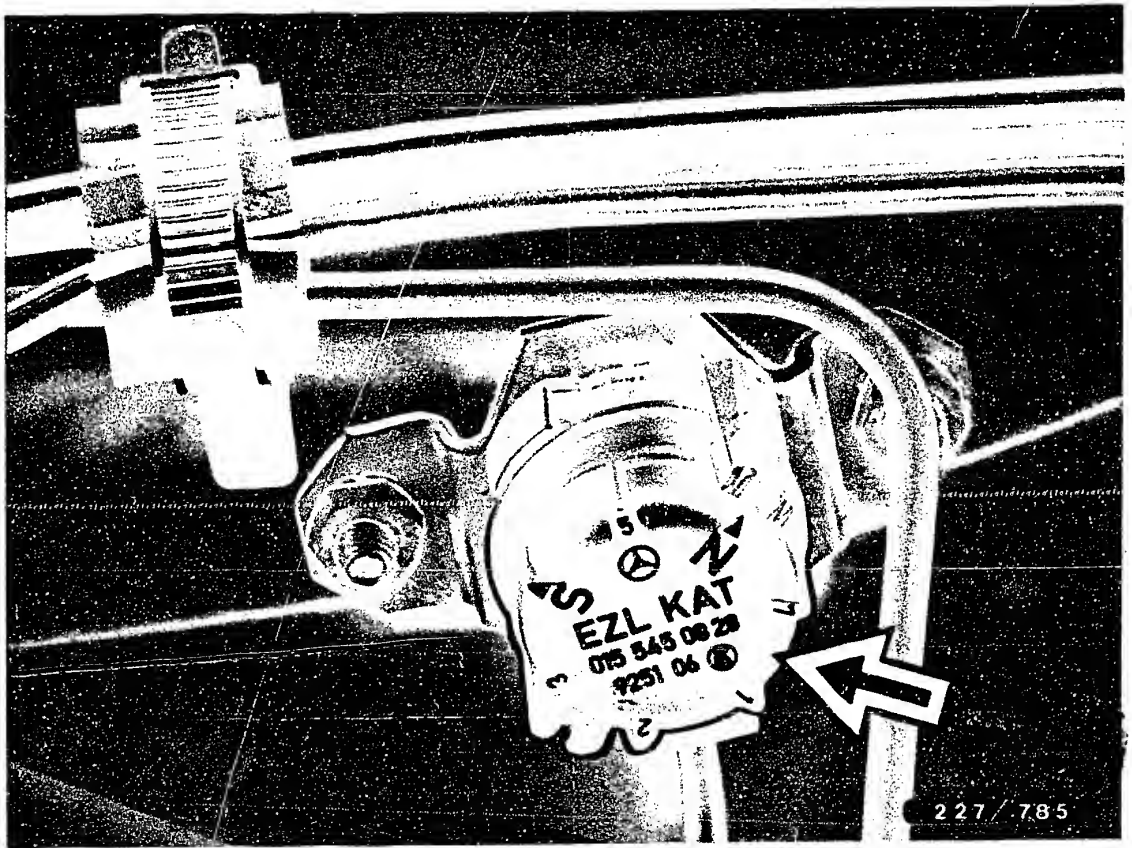


- 1 = Electronic ignition control unit
e.g. vehicle model 124
- 2 = Vacuum hose
- 3 = Quadruple plug - power supply
- 4 = Quadruple plug - sensor
- 5 = Coaxial plug - pulse generator
- 6 = Diagnostic socket
- 7 = Plastic ignition coil with protective cover

4. Installation position of components

Electronic-ignition control unit, diagnostic socket and ignition coil are situated on the wheel housing on the left-hand side as viewed in the forward direction of travel.

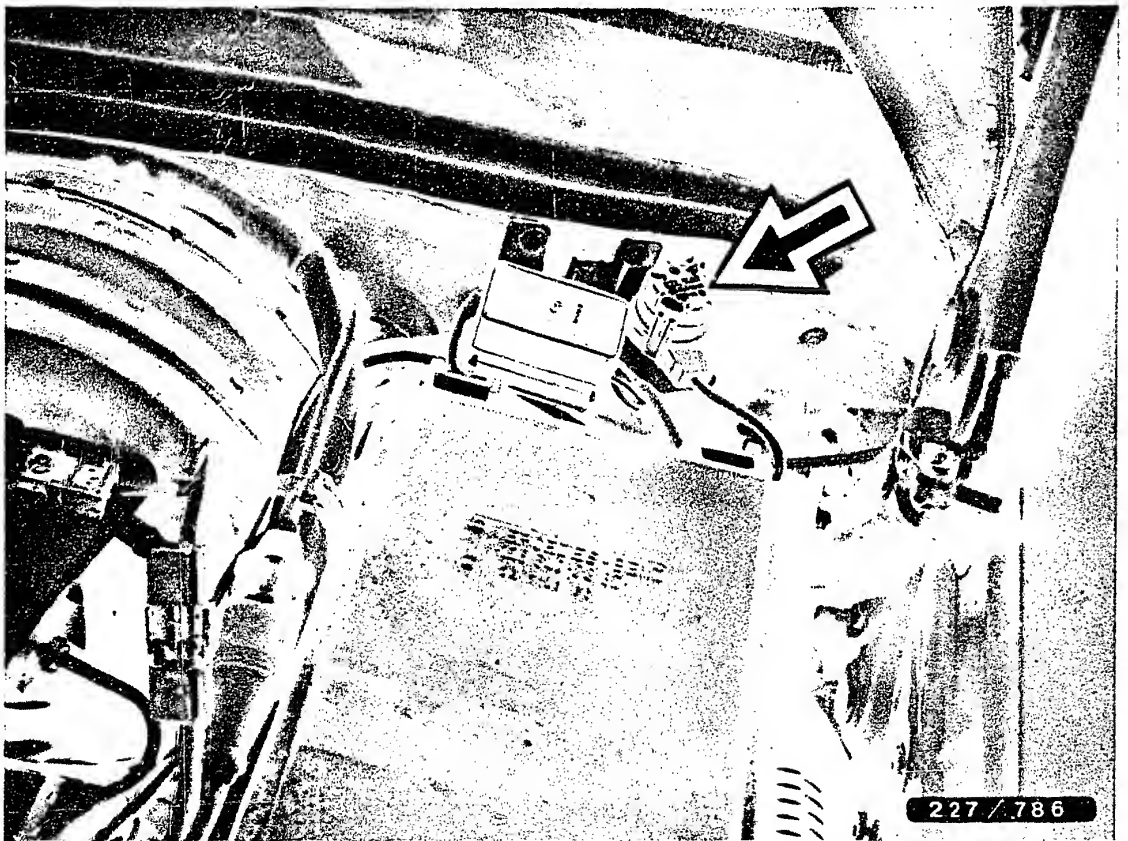




Arrow = Adjustment plug, ignition, vehicle type 124

The adjustment plug is located on the engine compartment partition (near brake master cylinder or fuse box).



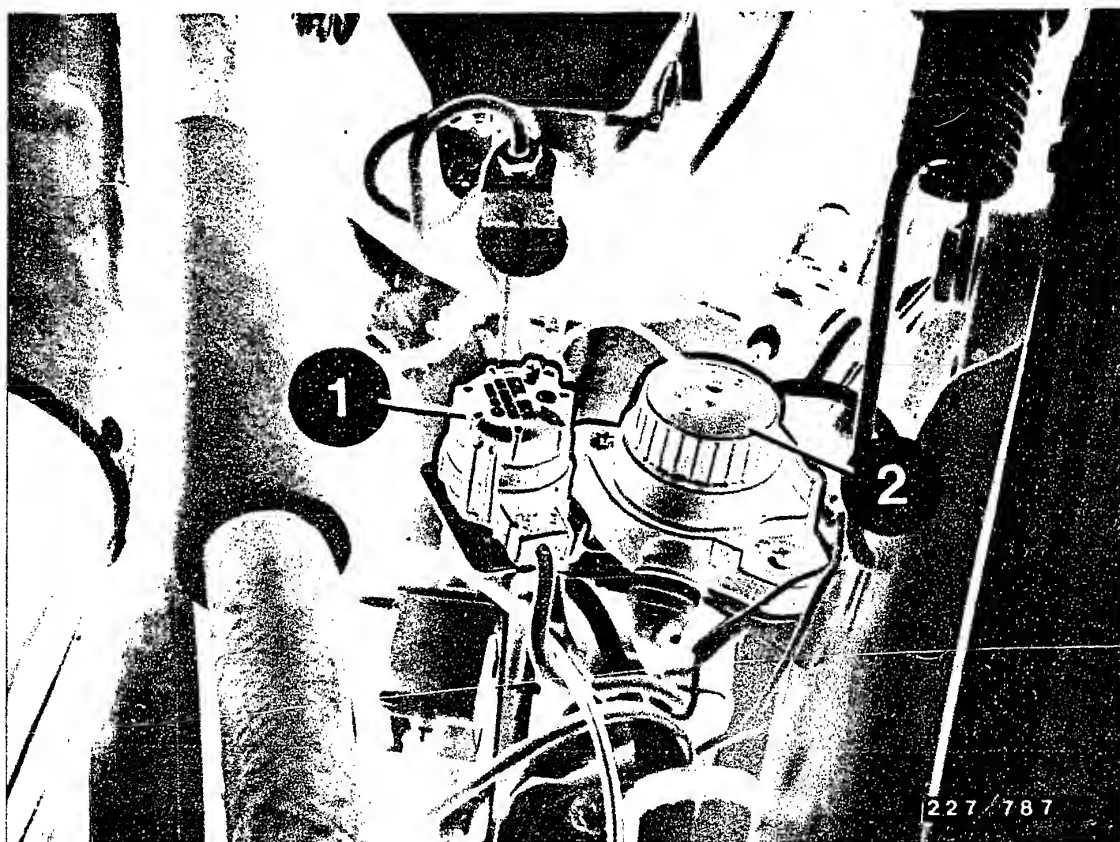


Arrow = Adjustment plug, ignition, vehicle type 126

E11

Installation position of components
Mercedes-Benz





1 = Adjustment plug, ignition, vehicle type 107

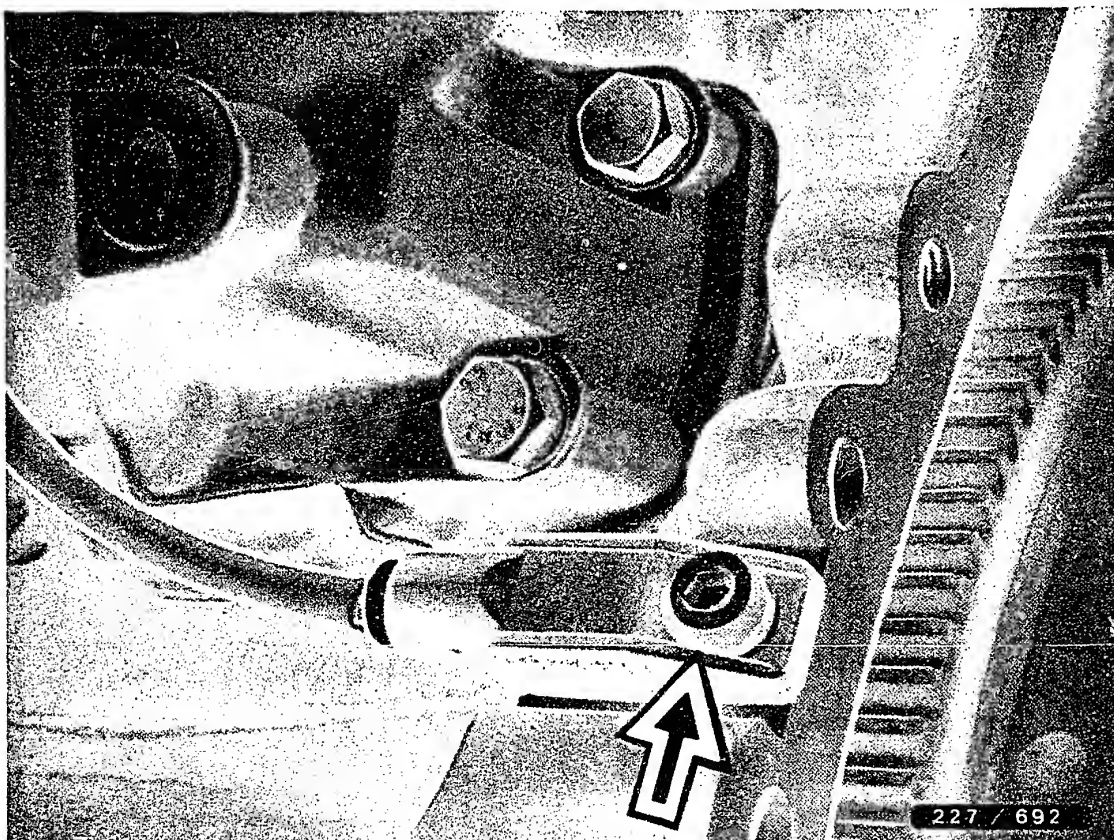
2 = Diagnosis socket

E12

Installation position of components

Mercedes-Benz





Arrow = Pulse generator

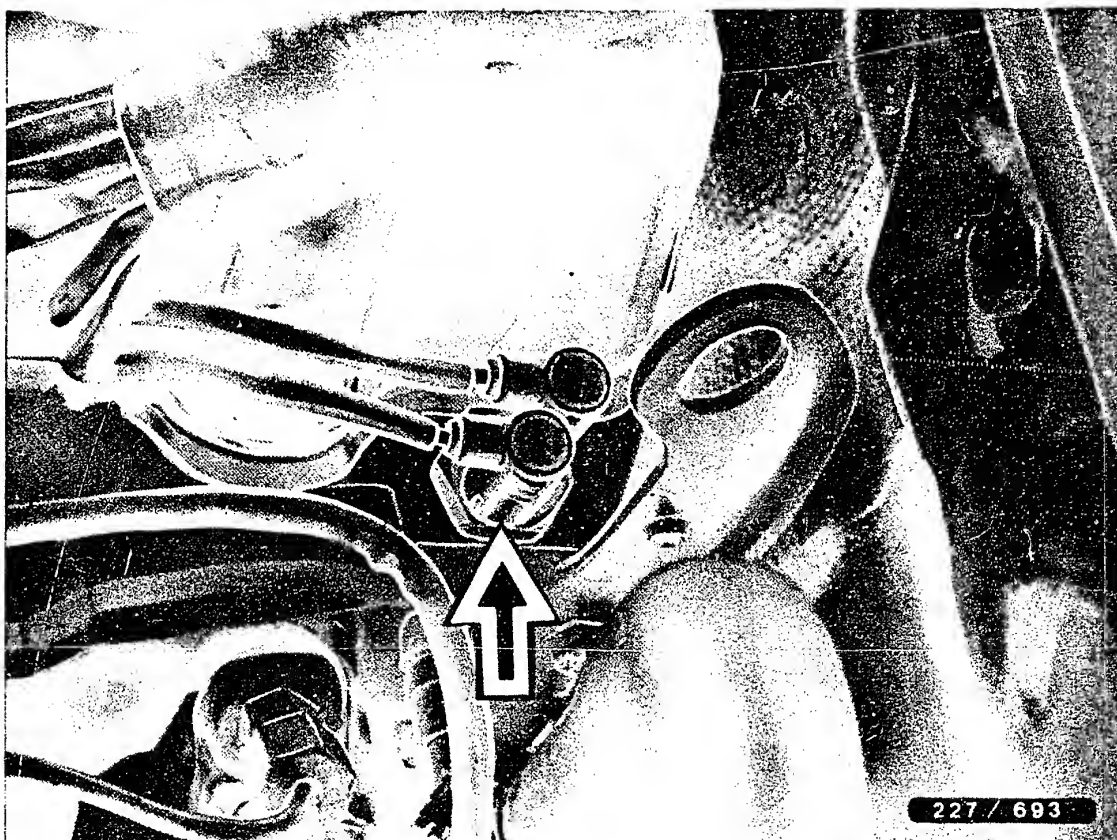
The pulse generator is located on the engine block on the left, looking in the direction of forward vehicle travel.

E13

Installation position of components

Mercedes-Benz

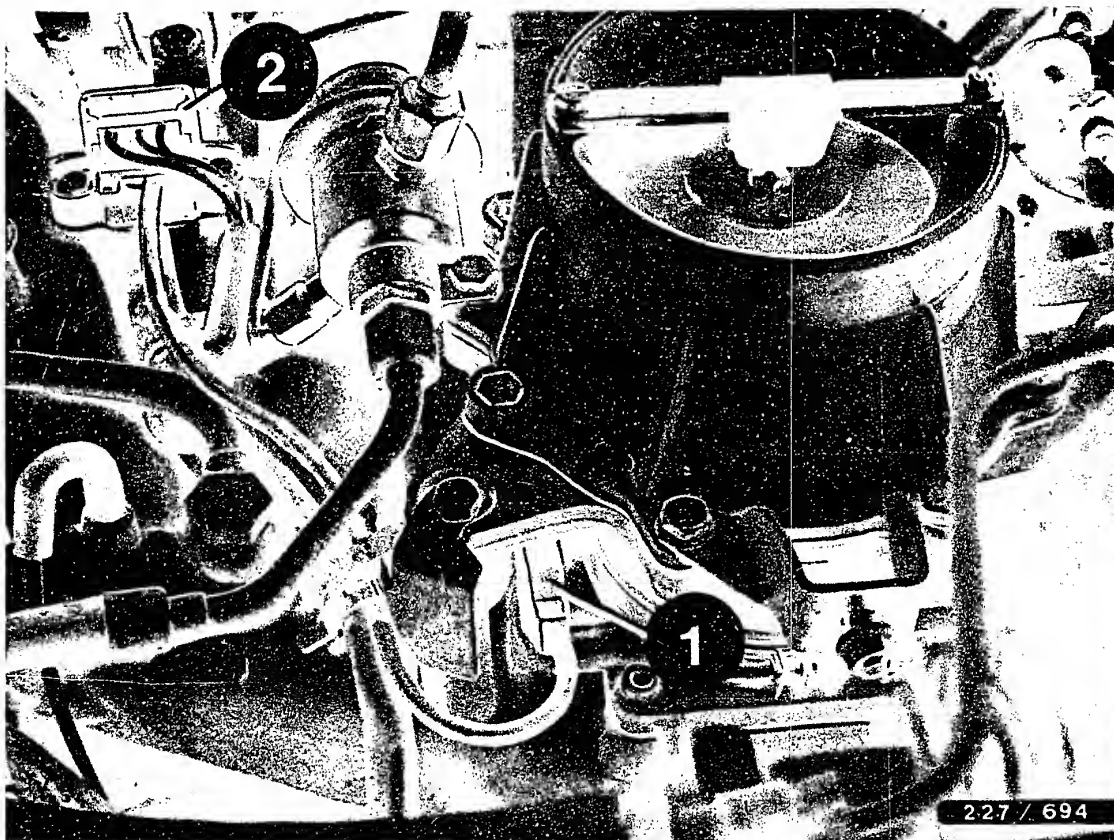




Arrow = Coolant temperature sensor (double NTC)

The coolant temperature sensor is situated on the side of the cylinder head.





- 1 = Throttle-valve switch
- 2 = Plug connection from the throttle valve switch

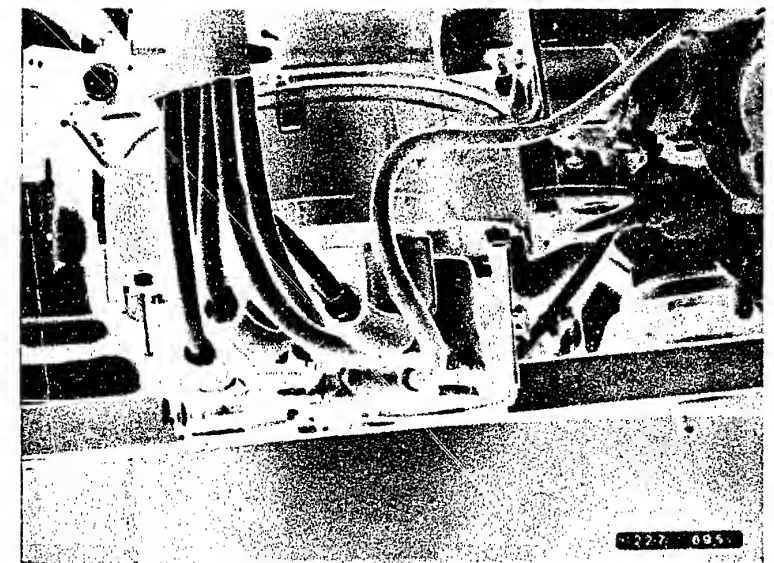
The throttle-valve switch is located on the throttle-valve assembly.



The high-voltage distributor (see top picture) is mounted on the front cover of the cylinder head and is driven directly by the camshaft by the driver (see bottom picture, arrow).

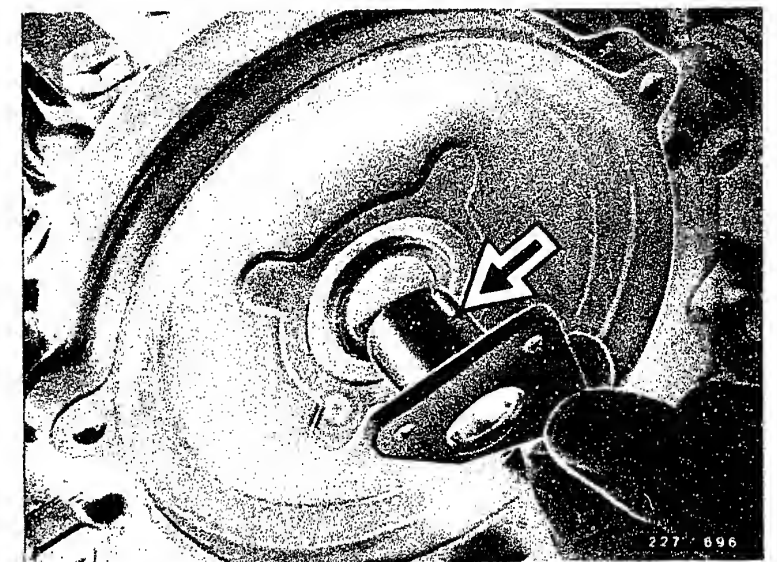
The ignition cables on the distributor cap should be mounted in the sequence 1, 3, 6, 2, 4, 5 (proper routing of ignition cables).

See next Coordinate for information on removal.



High- voltage distributor

Driver



E16

Installation position of components

Mercedes-Benz



E17

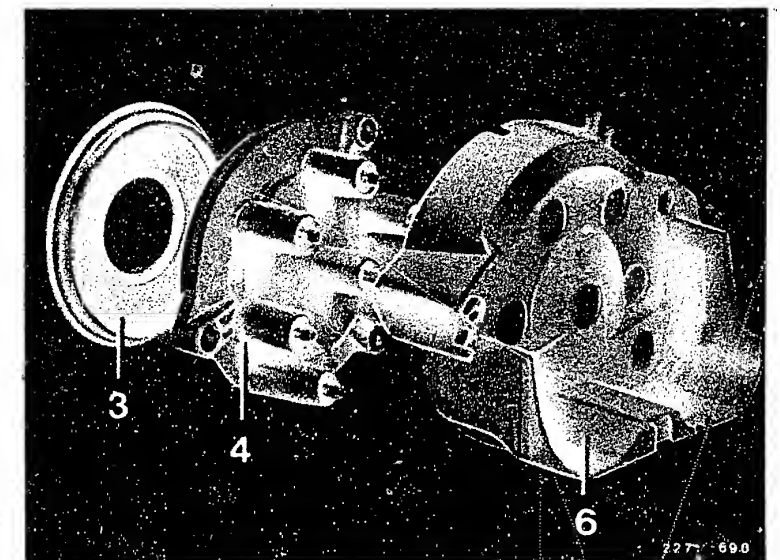
Installation position of components

Mercedes-Benz



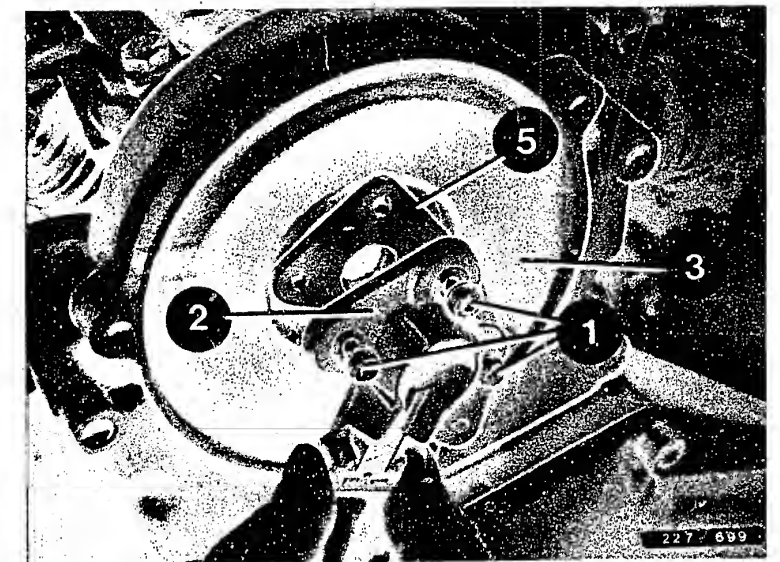
How to remove high-voltage distributor

Unclip the hood from the sides (see upper illustration, arrows) and pull up.



Key to picture

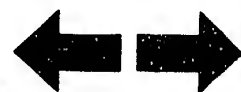
- Item 1 = Fastening screws
- Item 2 = Distributor rotor
- Item 3 = Sealing disc
- Item 4 = Distributor cap
- Item 5 = Driver
- Item 6 = Screening cover



E18

Installation position of components

Mercedes-Benz



E19

Installation position of components

Mercedes-Benz



5. Necessary test equipment and aids

Motortester e.g.	MOT 201	0 684 000 201
Pulse shaper (Required for measuring the primary voltage with MOT 201, 202, 206 and 400)		1 684 463 154
Adapter lead for the diagnosis socket		1 684 463 094
Spark gap e. g. ignition coil and condenser tester	EFAW 106 A	0 681 100 001
or single spark gap	EF 1177/7	1 684 531 000
5 k Ω sleeve-type suppressor		0 356 500 001
Ohmmeter	ETE 014.00	0 684 101 400
or e. g.	Pontava Wh2	commercially available
Voltmeter e.g.	ETE 014.00	0 684 101 400
Thermal conduction paste		5 942 860 003
Test prod, black		1 684 485 034
Test prod, red (for correctly connecting test equipment to plug connections)		1 684 485 035



6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts of terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

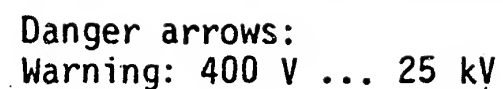
The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

- Connecting of engine test equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc.).

If, while testing the ignition system or during adjustment work on the engine (e.g. KE-Jetronic), it becomes necessary to switch on the ignition (switch on ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

The danger of accident exists, therefore, not only on the individual assemblies of the ignition system (e. g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e. g. tachometer connection, diagnostic plug), at plug-in connections and test equipment.





- 5 = Pulse generator
 - 6 = Diagnostic socket
 - 7 = Ignition coil
 - 8 = Ignition/starting switch
 - 9 = Battery
 - 10 = Trimming plug
- Legend e.g. for
EZL-KAT

- W 3 = Ground, wheel
housing front left
(ignition coil)
- W 5 = Ground, engine
- W10 = Ground, battery
- W11 = Ground, engine
(electric lead
screwed on)

The hazard locations are identified with high voltage arrows using, as an example, the connection diagram for an electronic ignition system.

7. Incorrect indication of engine speed, dwell angle and ignition point

In the case of ignition systems with control unit 0 227 400 5.. or control units from Siemens (electronic ignition) with current limitation, there can be an incorrect reading for engine speed, dwell angle, and ignition timing on the test instruments.

For further details see coordinates N 7 - N 11.



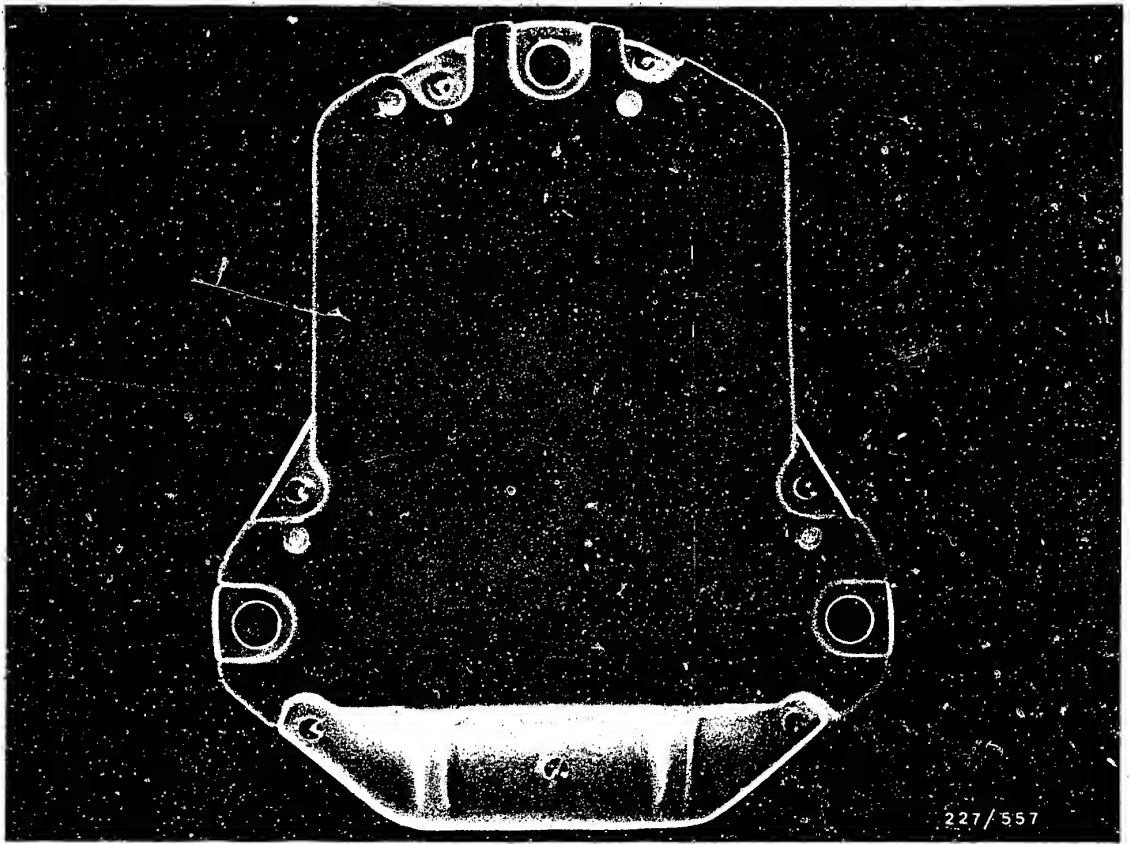
8. Important vehicle information

- Resistance measurements must only be performed with the ignition switched off or with the battery disconnected (measuring instrument defective).
- For a compression test, disconnect the coaxial plug (pulse generator) from the electronic ignition control unit.
- Never disconnect the battery while the engine is running.
- A starting assist with more 16 Volts or with a quick-charger is not permitted.
- The specified ignition coil (see Part.No.) must not be replaced with a different ignition coil.
- No suppression capacitor must be connected to ignition coil terminal 1.
- Ignition coil terminal 1 must not be brought into contact with ground as a theft-proofing measure (ignition coil will be destroyed when ignition is switched on).
- No battery + or test lamp must be connected to ignition coil terminal 1 (the electronic ignition control unit is destroyed).
- The ignition lead from the ignition coil Term. 4 to the high voltage distributor Term. 4 must not be disconnected during operation.
- There must be no arcing from ignition coil terminal 4 to ignition coil terminal 1 and 15.
The electronic ignition control unit can be destroyed.



- If the poles are reversed on the ignition coil (Term. 1 and Term. 15) there are severe losses of ignition energy, causing missing. In addition, the electronic ignition control unit is overloaded. In order to preclude reversal of poles, the terminal studs have different diameters. (M5 and M6)
- In order to avoid destruction of the electronic ignition control unit, the secondary end of the ignition system must have interference suppression of min. 2 k Ω . The original distributor rotor must be installed with an interference suppression resistor of 1 k Ω .
- If the poles on the battery are incorrectly connected, the electronic ignition control unit and the ignition coil are destroyed.





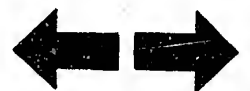
- Before putting on the electronic ignition control unit, the base plate (see the Figure, bright surface) must be coated with a heat conduction paste.

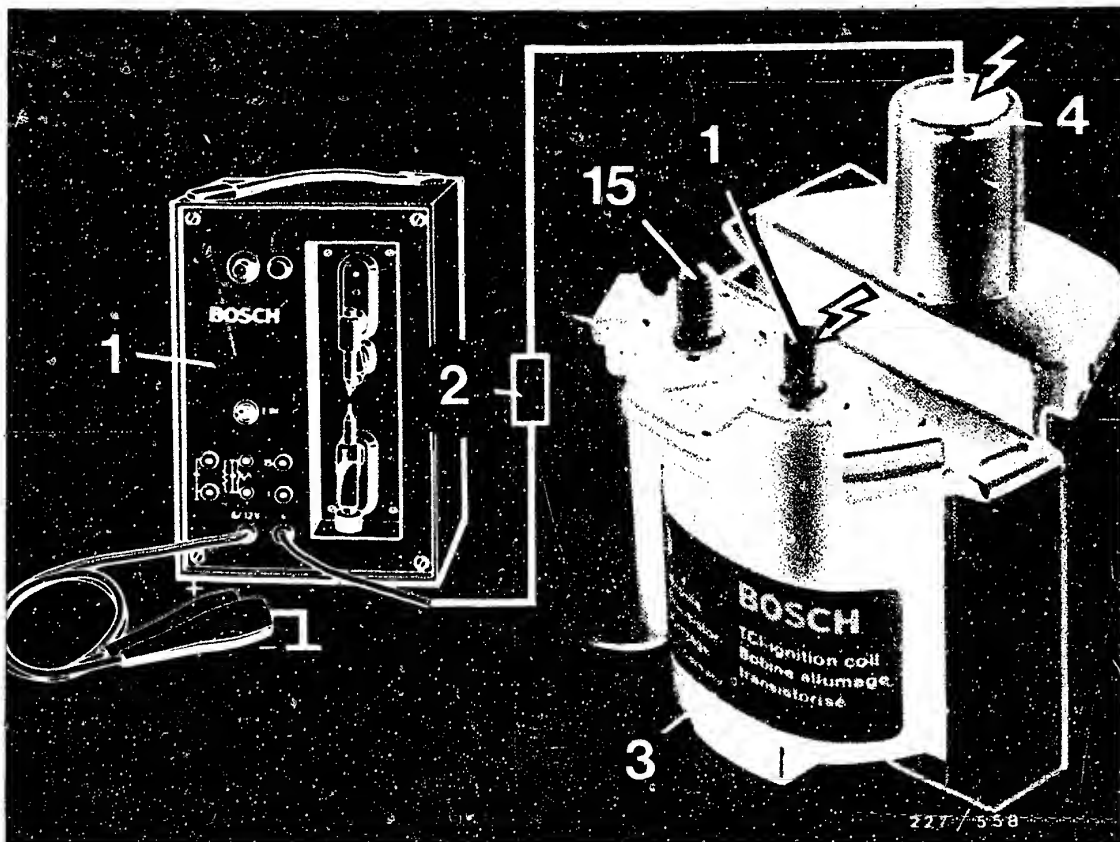
Apply thermal conduction paste only with a suitable object (screwdriver, etc.).

Do not apply thermal conduction paste to painted parts.

F3

Important vehicle information
Mercedes-Benz





High voltage arrows:
Warning, 400 V ... 25 kV!

1 = Spark gap
2 = 5 kΩ sleeve-type suppressor
3 = Ignition coil

- When using a spark gap - in order to prevent irreparable damage to the electronic-ignition control unit - an interference-suppression resistor of at least 2 kΩ must be connected between the spark gap and ignition coil terminal 4, e.g. sleeve-type suppressor (5 kΩ) 0 356 500 001.

Adjust ignition point to the available fuel

1. General

These vehicles can be operated with PREMIUM and REGULAR fuel, leaded or lead-free. This requires the ignition point to be adjusted appropriately.

To adjust, pull adjustment plug out until the stop is reached, turn to the correct position, and press back in. See illustrations.

Code letter S on adjustment plug = lead-free or leaded premium fuel

N on adjustment plug = lead-free or leaded regular fuel.

ECE on adjustment plug = non-lambda operation

KAT on adjustment plug = lambda operation

This adjustment for PREMIUM or REGULAR FUEL can also be undertaken by the customer.

Note:

The best performance and fuel consumption is obtained with PREMIUM FUEL. If a change is made from PREMIUM to REGULAR fuel, the ignition-timing adjustment must be altered (danger of damage to engine). The ignition-timing adjustment must also be changed when switching from REGULAR to PREMIUM fuel.

2. INITIAL IGNITION-TIMING ADJUSTMENT on vehicles WITHOUT CATALYTIC CONVERTER

2.1 Ignition point for leaded and lead-free PREMIUM FUEL

ADJUSTMENT PLUG with legend EZL ECE (code color white) in POSITION "S". See upper illustration.

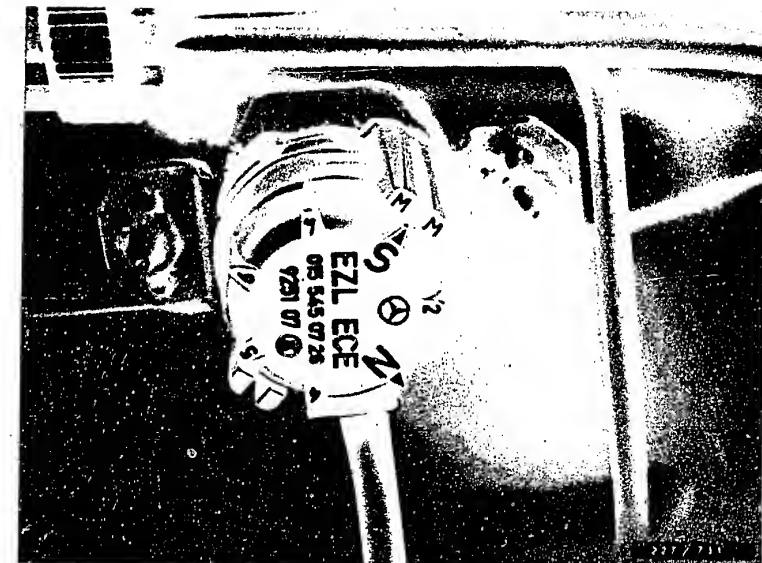
Correction adjustment for the workshop

For poor-quality premium fuel, set the adjustment plug in position "2". See illustration.

The ignition point is RETARDED by 3°.

2.2 Ignition point for leaded and lead-free REGULAR FUEL

ADJUSTMENT PLUG with EZL ECE legend (code color white) in position "N". See lower illustration.



Adjustment plug position "S" here on vehicle type 124



Adjustment plug position "N" here on vehicle type 124

F5

Important vehicle information

Mercedes-Benz



F6

Important vehicle information

Mercedes-Benz



3. INITIAL IGNITION-TIMING ADJUSTMENT with vehicles WITH CATALYTIC CONVERTER

3.1 Ignition point for lead-free PREMIUM FUEL

ADJUSTMENT PLUG with legend EZL KAT (code color green) in position "S". See upper illustration.

Correction adjustment for the workshop

For poor-quality premium fuel, set adjustment plug to position "5". See upper illustration.

Ignition point is RETARDED by 3°.

3.2 Ignition point for lead-free REGULAR FUEL

ADJUSTMENT PLUG with legend EZL KAT (code color green) in POSITION "N". See lower illustration.

Correction adjustment for the workshop

For poor-quality regular fuel, set adjustment plug to position "7". See lower illustration.



Adjustment plug position "S"
e.g. vehicle type 124

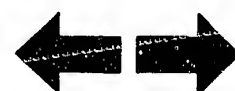
Adjustment plug position "N"
e.g. vehicle type 124



F7

Important vehicle information

Mercedes-Benz



F8

Important vehicle information

Mercedes-Benz



9. Trouble-shooting

9.1 How to use the trouble-shooting chart

The trouble-shooting chart starting on Coordinate G 3 contains customer complaint (fault symptom), cause of trouble, test instructions and coordinate references.

The possible cause of the fault should be selected from the trouble-shooting chart in accordance with the customer complaint (fault symptom).

If the cause of the fault is not clear, start testing with the detailed, self-contained trouble-shooting program beginning on Coordinate G 9.

If the cause of the fault is clear from the trouble-shooting chart, direct trouble-shooting is possible by going to the stated coordinate without having to perform the entire trouble-shooting program for each fault.

If there is no coordinate reference, trouble-shooting must be performed in accordance with the "Test instructions" column.

9.2 Procedure - trouble-shooting program

The trouble-shooting program starting on Coordinate G 9 is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The center row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and the explanations of the items in the picture.

If the questions asked in the left-hand row can be answered conclusively with "yes", then proceed to the next test down.

If the answer to the question is "no", branch to the center row and carry out the tests given there.

9.3 Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e. g. compression, valve clearance etc.). Ambient temperature/ignition system temperature 0° to 100° C (temperature has a considerable effect on measured values).

G1

Trouble-shooting
Mercedes-Benz



G2

Trouble-shooting
Mercedes-Benz



9.4 Trouble-shooting chart

Customer complaint (fault symptom)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

8. Backfiring

9. Engine becomes too hot

Cause of fault

Test instructions

Coordinates

•	•	•	•	•	•	•	•	•	Unclear	Perform detailed trouble-shooting	G 9
•	•	•	•	•	•	•	•		Spark plugs defective	Assessment by means of ignition oscilloscope or visual examination of spark plug when removed	----
•	•	•	•	•					Shunt on secondary side	Evaluation of the ignition coil, high voltage distributor, ignition harness, and spark plug by means of the ignition oscillogram or a visual inspection	----
•	•	•	•	•					Open circuit on secondary side	Assessment of ignition coil, ignition distributor, ignition harness and spark plug by means of ignition oscilloscope, or continuity test with ohmmeter	----
•									Open circuit on primary side	--	H 11
•	•	•	•	•					Ignition coil defective	-	G 11
		•	•	•	•				Interference-suppression resistors defective	Assessment by means of ignition oscilloscope or resistance measurement	----

G3

Trouble-shooting chart

Mercedes-Benz



G4

Trouble-shooting chart

Mercedes-Benz



Customer complaint (fault symptom)

G5

Mercedes-Benz

**G6**

Mercedes-Benz



Trouble-shooting chart (continued)

Customer complaint (fault symptom)

1. Starting motor operates, engine fails to start
2. Rough idling
3. Poor throttle response (flat spot during acceleration)
4. Insufficient engine power
5. Misfiring
6. Fuel consumption too high
7. Engine pings when accelerating
8. Backfiring
9. Engine overheats

									Cause of trouble	Test instructions	Coordinates
				●					Electronic ignition control unit not O.K.	---	H 7
●									Pulse generator not O.K.	---	H 9
●									Voltage supply to electronic ignition control unit not O.K.	---	H 11

G7

Trouble-shooting chart
Mercedes-Benz



G8

Trouble-shooting chart
Mercedes-Benz



9.5 Trouble-shooting program

Test primary signal. If no oscilloscope or tachometer available, check whether ignition spark across spark gap.

Remove the protective cap from the ignition coil.

Primary signal testing with oscilloscope

Connect oscilloscope to ignition coil as per operating instructions.

Start engine.

Oscilloscope must indicate a primary voltage (of any value).

Primary signal testing with tachometer

Connect tachometer to ignition coil as per operating instructions.

Start engine.

Tachometer must indicate a reading (of any value).

Ignition spark testing with spark gap

Remove H.T. ignition cable terminal 4 from ignition coil.

Connect spark gap including sleeve-type suppressor

(5 k Ω) to ignition coil.

Adjust spark gap to 5 mm.

Start engine.

There must be sparks across the spark gap.

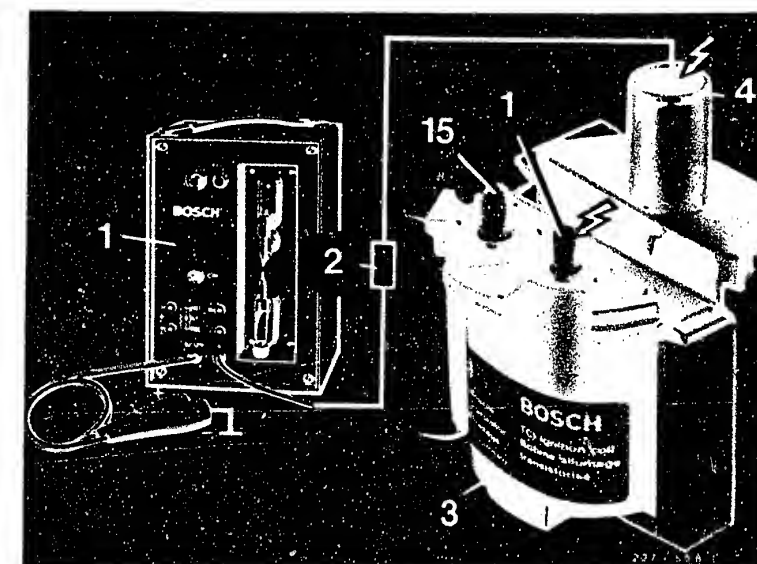
Primary signal present or ignition sparks across spark gap?

yes

Continued on G11/G12

If no primary signal or no ignition spark,
continue testing at H9.

Tests from G11 onwards not necessary.



High voltage arrows:

Warning, 400 V ... 25 kV!

1 = Spark gap

2 = 5 k Ω sleeve-type suppressor

3 = ignition coil

G9

Trouble-shooting program

Mercedes-Benz

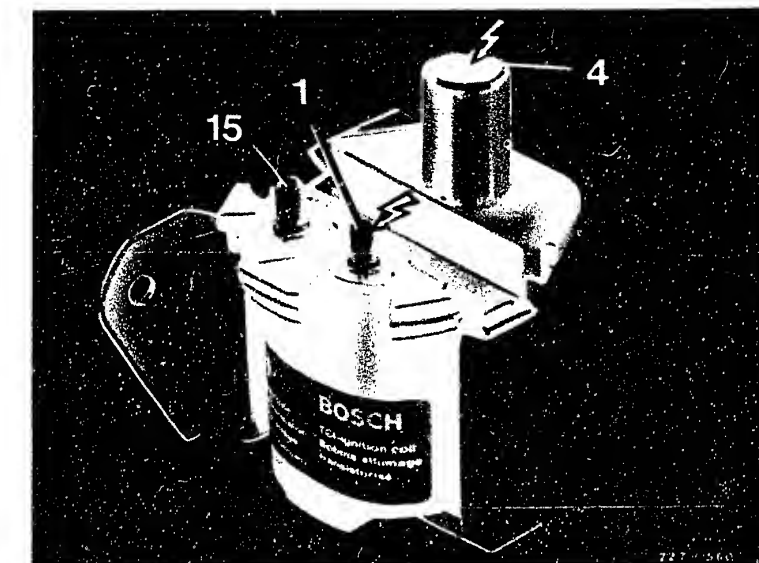
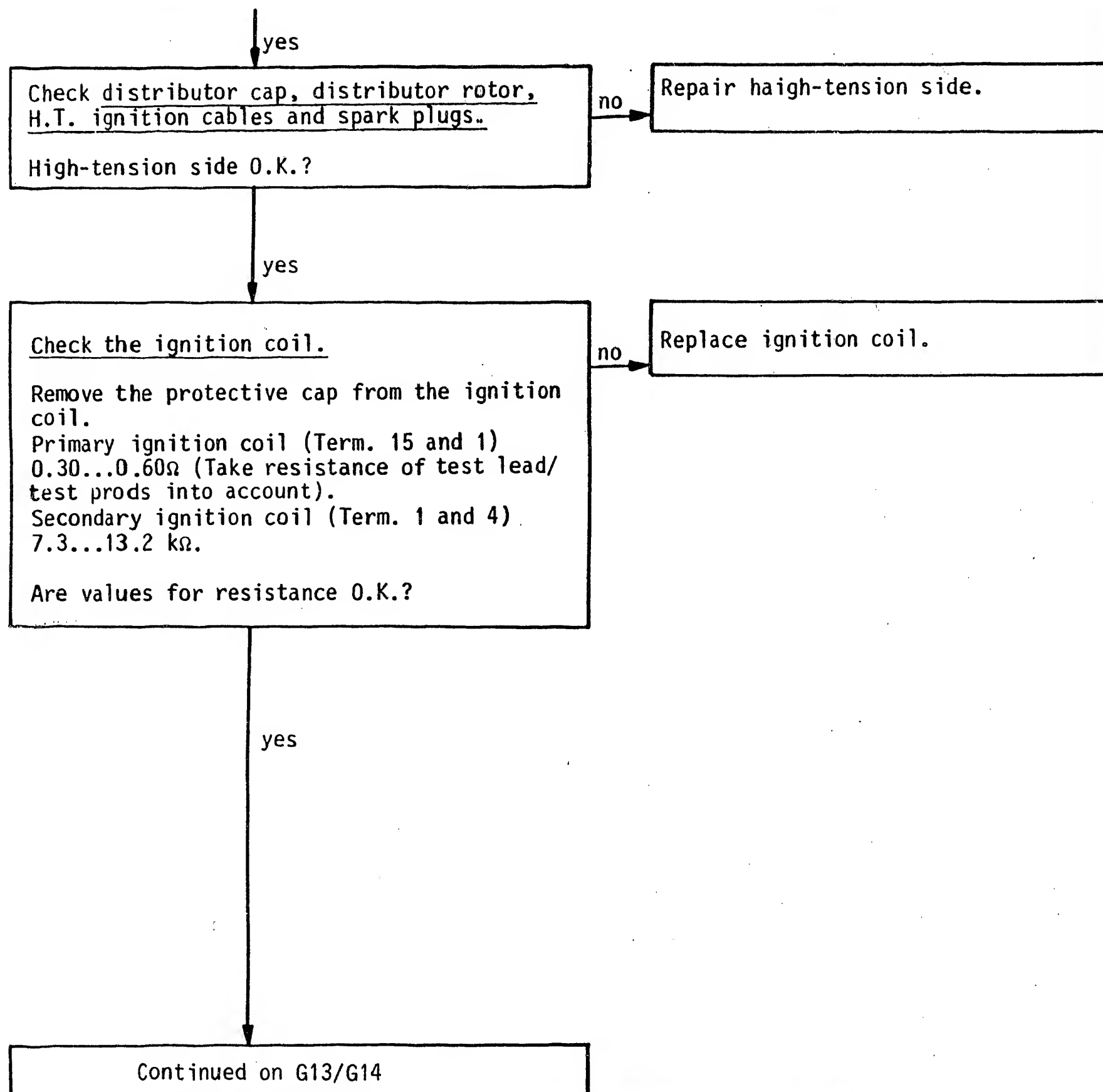


G10

Trouble-shooting program

Mercedes-Benz





High voltage arrows:
Warning, 400 V ... 25 kV!



Engine running?

no

Disconnect the negative and positive leads from the battery.

Disconnect the electronic ignition control unit plug. Switch the ignition on.

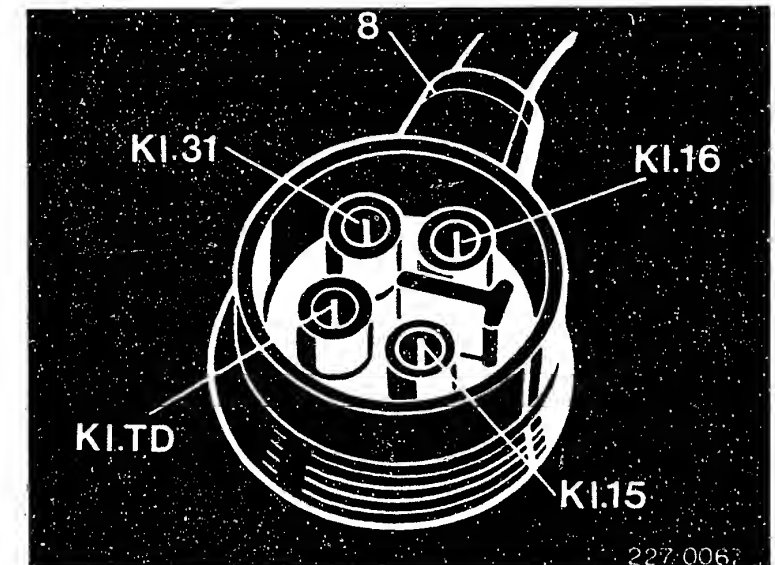
1. Check the leads from the positive battery terminal to the electronic ignition control unit plug Term. 15 and the leads from the negative battery terminal to the electronic ignition control unit plug Term. 31 for contact resistances. Max. total contact resistance 0.3Ω. (Take resistance of test lead into consideration). Eliminate contact resistances.

2. Check the leads from the positive battery terminal to the ignition coil Term. 15 and the lead from the ignition coil Term. 1 to the electronic ignition control unit plug Term. 16 for contact resistance. Max. total contact resistance 0.3 Ω. (Take the resistance of the test lead into consideration). Eliminate any contact resistance.

3. If points 1 and 2 are OK, try installing the prescribed ignition coil. If engine still does not run, re-install "old" ignition coil and replace the EI control unit.

yes

Continued on G15/G16



EI control unit plug

G 13

Trouble-shooting program
Mercedes-Benz



G 14

Trouble-shooting program
Mercedes-Benz



yes

Check the pressure sensor

Connect the motortester to the diagnosis socket using an adapter cable. Disconnect the vacuum hose from the electronic ignition control unit. See the Figure at the top.

Take the plug connection from the throttle valve switch apart. See the Figure at the bottom. Run the engine at idle.

Take reading for timing angle.

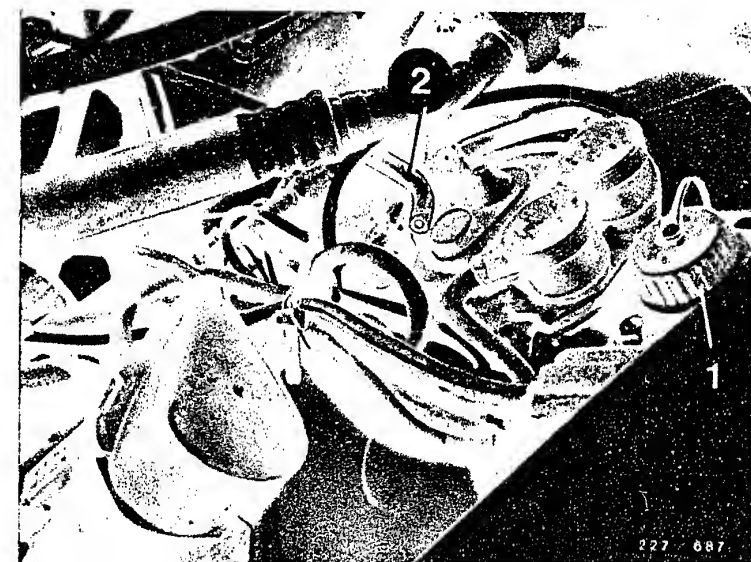
Put the vacuum hose back on the electronic ignition control unit. When this is done, the timing angle must change noticeably (in the direction "advance").

Did the timing angle change?

no

1. Check the vacuum hose from the electronic ignition control unit to the intake manifold plug connection for leaks. Eliminate any leaks.

2. If there was no leak, take out and replace the electronic ignition control unit.



1=Diagnosis socket

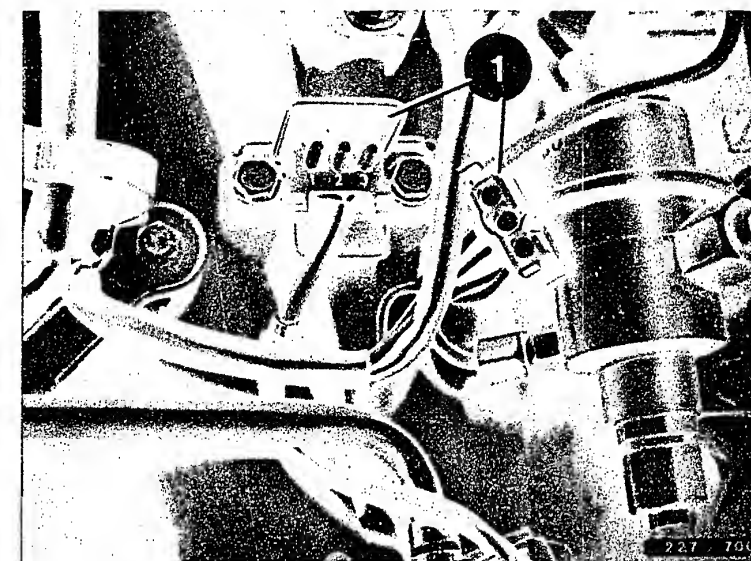
2=Vacuum hose

e.g. vehicle model 124

yes

Continued on G17/G18

1=Plug connection from the throttle valve switch



G15

Trouble-shooting program

Mercedes-Benz



G16

Trouble-shooting program

Mercedes-Benz



yes

Check the coolant temperature sensor.

Warm the engine up to normal operating temperature.
Connect the motortester to the diagnosis socket using an adapter lead.
Disconnect vacuum hose from electronic-ignition control unit (not shown).
Take apart throttle-valve switch plug connector (top picture Item 1).
Run engine at idle.
Take reading for timing angle.
Disconnect the coolant temperature sensor plug (color of cable green/black). See arrow in center picture).
When this is done, the timing angle must change.

Did the timing angle change?

yes

Continued on G19/G20

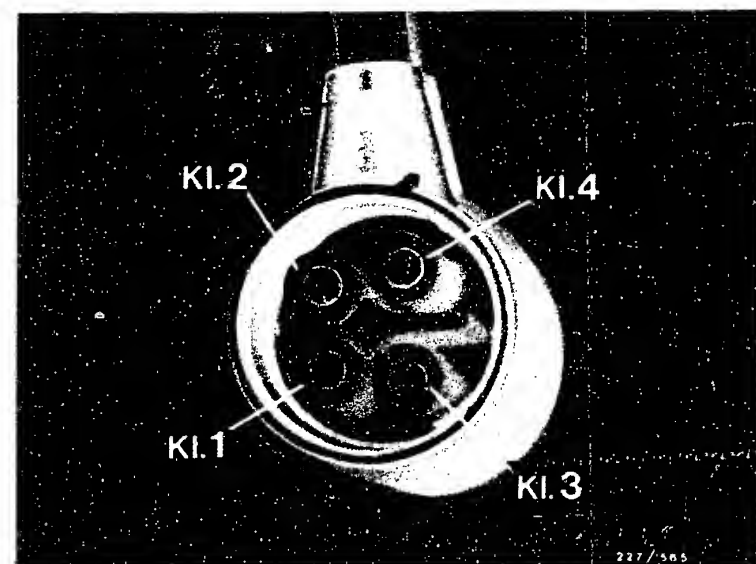
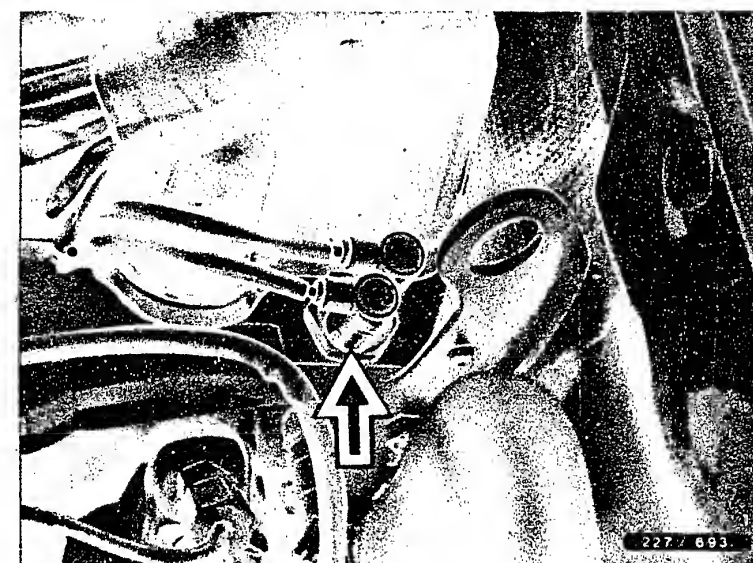
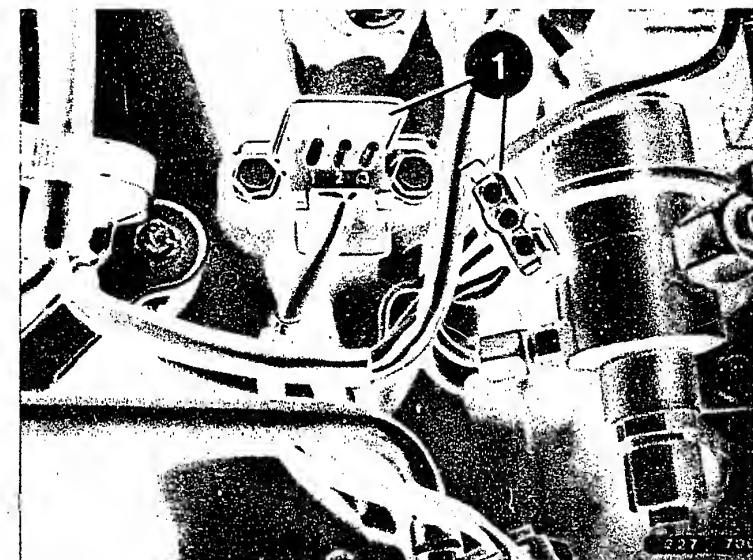
no

Switch the ignition off.
Disconnect the electronic ignition control plug and connect an ohmmeter to Term. 1 (see figure at bottom) and vehicle ground.
For resistances, see the table.

Coolant temperature	Resistance
---------------------	------------

+ 20°C	=	2.1...2.9 kΩ
+ 30°C	=	1.4...2.0 kΩ
+ 80°C	=	280...370 Ω
+ 90°C	=	210...280 Ω
+100°C	=	160...215 Ω

If the ohmmeter reads $\infty\Omega$, then check the lead from the coolant temperature sensor plug (color of cable green/black) to the electronic ignition control unit plug Term. 1 for continuity. Eliminate any break. If the values for resistance deviate, take out and replace the coolant temperature sensor.



G17

Trouble-shooting program

Mercedes-Benz



G18

Trouble-shooting program

Mercedes-Benz



▼ yes

Check spark advance.

Engine at operating temperature.

Motortester with adapter lead connected to diagnostic socket.

Vacuum hose from EI control unit is pulled off. See upper illustration.

Plug connection from throttle-valve switch is pulled. See upper illustration.

Spark-advance nominal value for 260E, 260 SE
Vehicles WITH catalytic converter

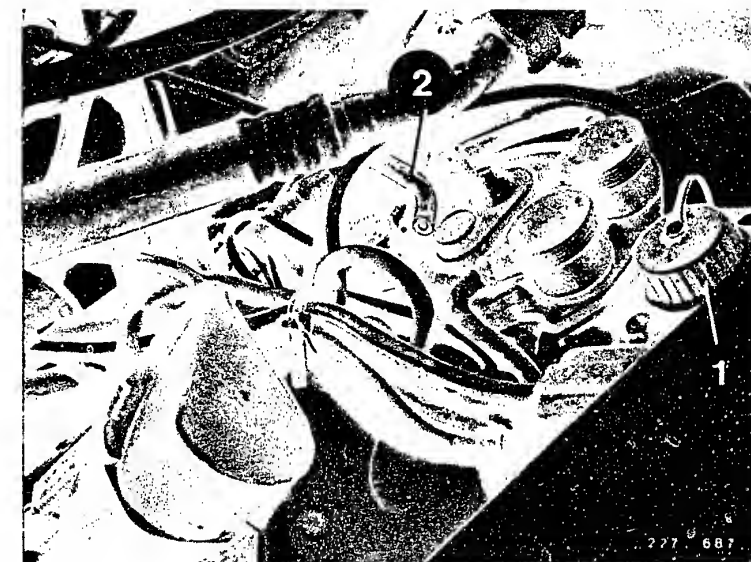
Adjustment plug	Engine speed min ⁻¹ / °CS
EZL KAT (green)	BTDC
Position S	3200 25 - 29°
Position N	3200 19 - 23°

Vehicles WITHOUT catalytic converter

Adjustment plug	Engine speed min ⁻¹ / °CS
EZL ECE (white)	BTDC
Position S	3200 25 - 29°
Position N	3200 19 - 23°

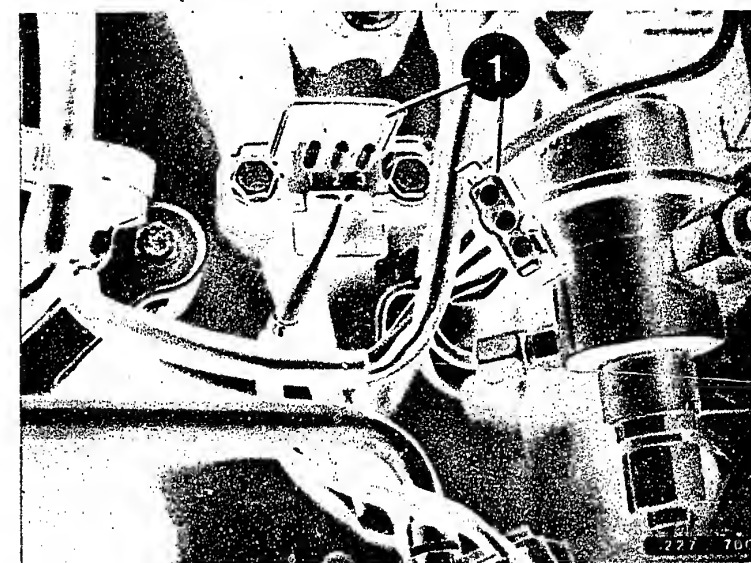
▼ yes

Continued on G21/G22



1 = Diagnostic socket
2 = Vacuum hose,
here on vehicle type 124

1 = Plug connection from
throttle-valve switch



G 19

Trouble-shooting program

Mercedes-Benz



G 20

Trouble-shooting program

Mercedes-Benz



Continued

Spark-advance nominal value for 300E, 300SE, 300SL

Vehicles WITH catalytic converter

Adjustment plug	Engine speed min ⁻¹ / °CS BTDC
EZL KAT (green)	
Position S	3200 27 - 31°
Position N	3200 21 - 25°

Vehicles WITHOUT catalytic converter

Adjustment plug	Engine speed min ⁻¹ / °CS BTDC
EZL ECE (white)	
Position S	3200 27 - 31° * 29 - 33°
Position N	3200 21 - 25° * 23 - 27°

* Only Sweden/Switzerland

Spark advance OK per table?

yes

Continued on H1/H2

no

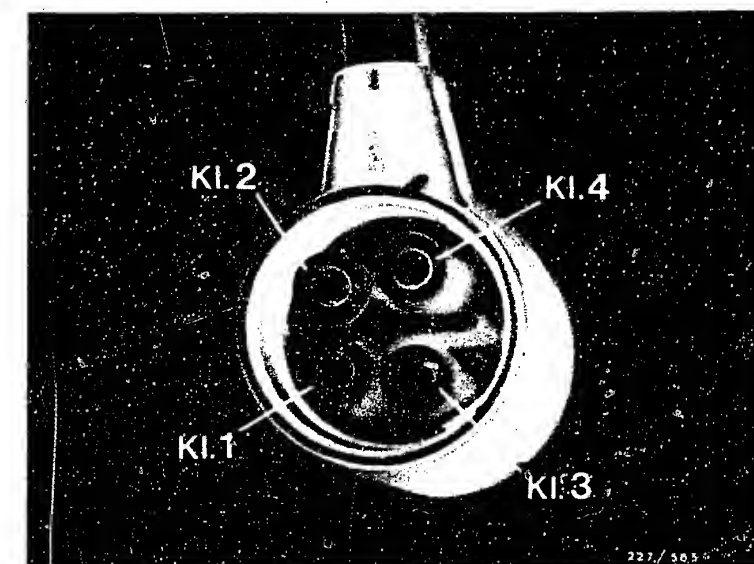
Switch off ignition. Pull EI control unit plug. See upper illustration. Connect ohmmeter to term. 3 and vehicle ground.

Move adjustment plug to positions 2 through 7 one after the other. See table for resistance values.

Note: The resistance network of both adjustment plugs is the same. The adjustment plugs differ only in being printed with EZL ECE (white) and EZL KAT (green). See lower illustration.

Adjustment- plug position	Resistance
ECE KAT	
S 1 =	∞Ω
2 2 =	2.4 kΩ
N 3 =	1.3 kΩ
4 3 =	750 Ω
5 5 =	470 Ω
6 N =	220 Ω
7 7 =	0 Ω

Continued on G23/G24



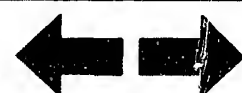
EI control unit plug

Adjustment plug (here EZL ECE), here on vehicle type 124



G21

Trouble-shooting program
Mercedes-Benz



G22

Trouble-shooting program
Mercedes-Benz

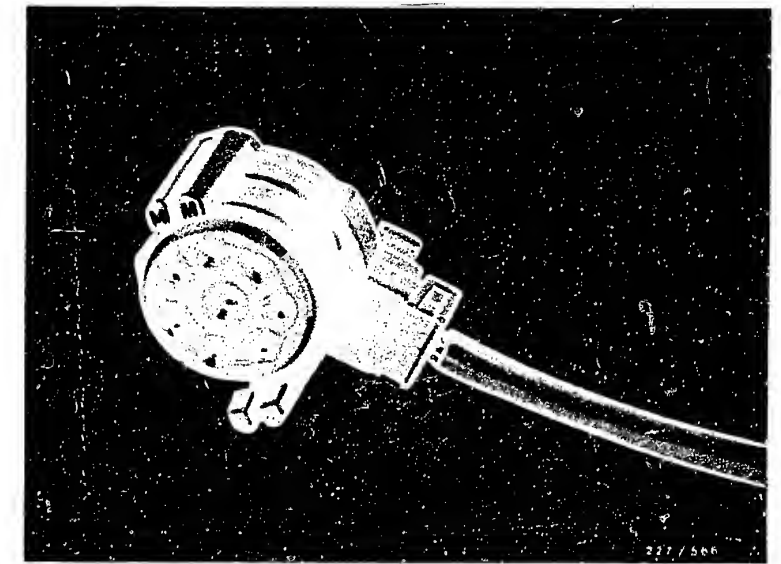


Continued

If resistance was O.K. in all 6 trimming-plug positions, replace electronic-ignition control unit.

If resistance was approx. $0\ \Omega$ or $\infty\ \Omega$ in all 6 trimming-plug positions, replace trimming-plug housing without trimming plug. See top picture.

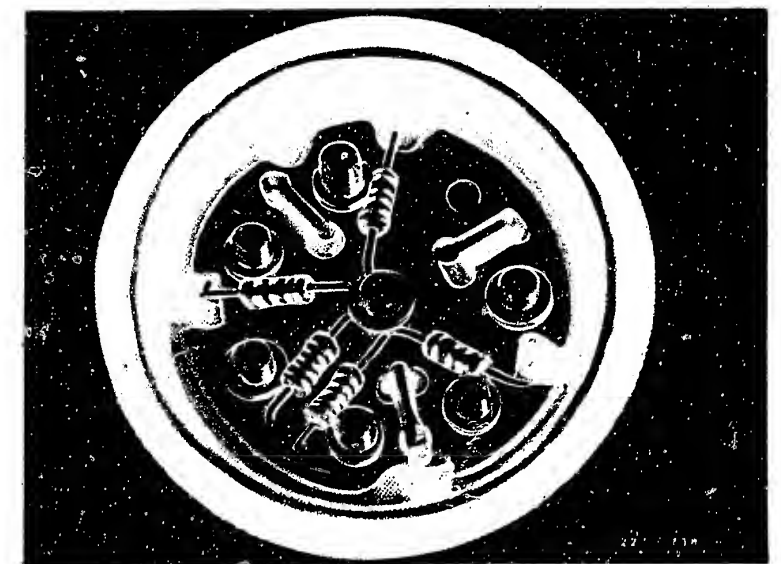
If resistance was not within tolerance, replace trimming plug. See bottom picture.



Trimming-plug housing

Yes

Adjustment plug (from rear)



Continued on H1/H2

G23

Trouble-shooting program
Mercedes-Benz



G24

Trouble-shooting program
Mercedes-Benz



yes

Check throttle-valve switch idle contact.
Switch off ignition. Pull KE-Jetronic control unit plug. See arrow in upper illustration, here with vehicle type 124. Pull EI control unit plug and connect ohmmeter to term. 2 and vehicle ground. See middle illustration.
Throttle-valve switch plug connector connected.
Throttle valve is in idle position.
Ohmmeter should show approx. $0\ \Omega$ (continuity).
Open throttle valve.
Ohmmeter must indicate $\infty\ \Omega$

no

1. Disconnect the plug connection from the throttle valve switch. See bottom picture. Connect an ohmmeter one after the other to:

Throttle valve switch plug connection (wiring-harness end)

Electronic ignition control unit plug

Term. 1 and Term. 2

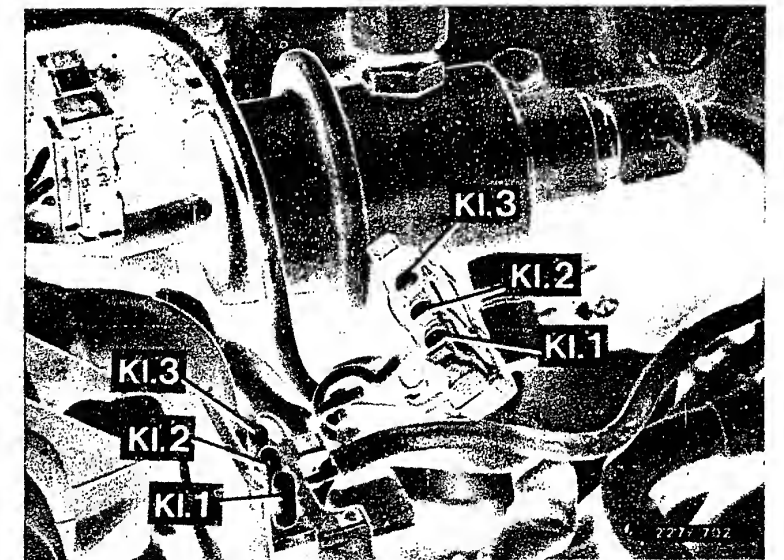
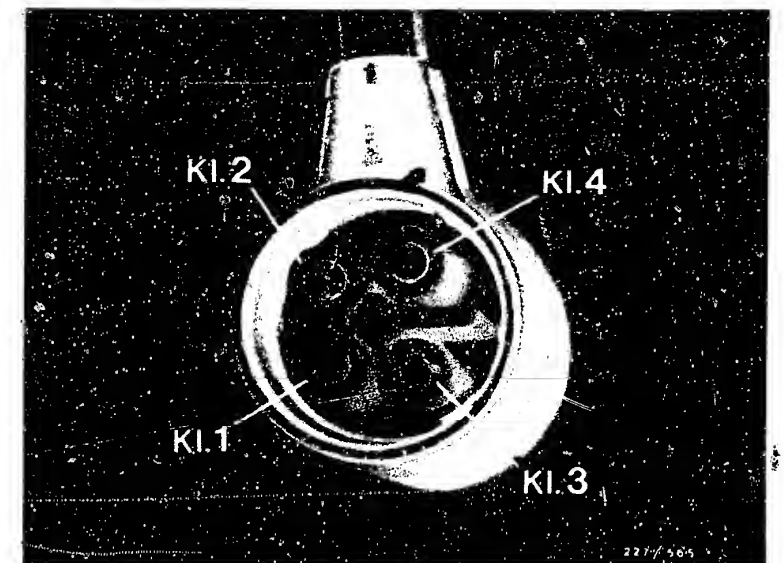
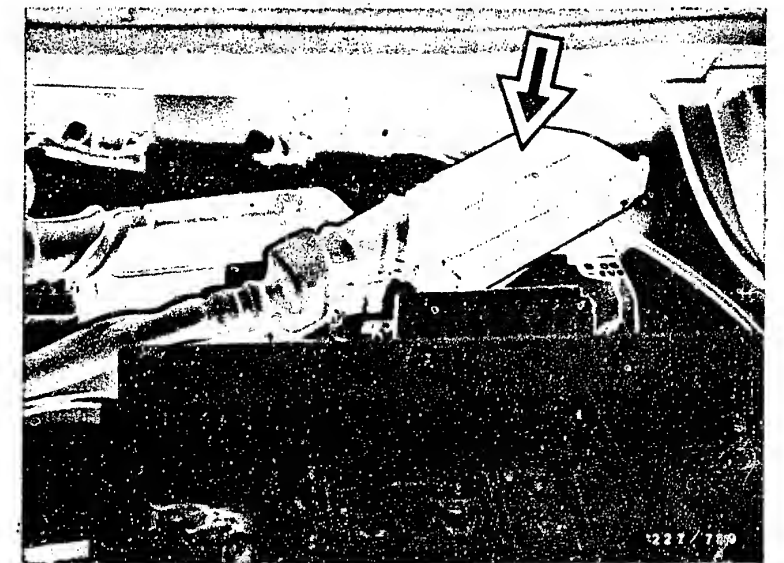
Term. 2 and vehicle ground

The ohmmeter must read approx. $0\ \Omega$ (continuity). Eliminate any break.

2. Connect the ohmmeter to the throttle valve switch plug connection Term. 1 and Term. 2. See the Figure at the bottom. The throttle valve is closed.
Resistance approx. $0\ \Omega$

Open the throttle valve. The ohmmeter must read $\infty\ \Omega$.

If resistance not O.K., replace throttle-valve switch.



yes

Continued on H3/H4

H1

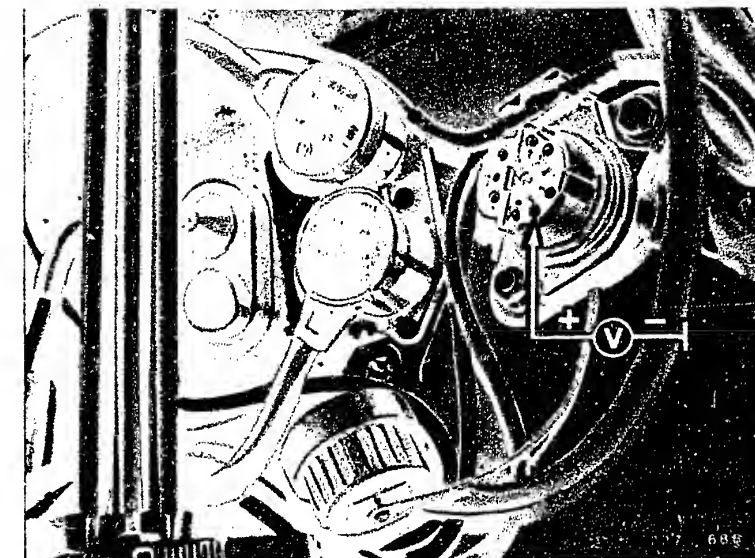
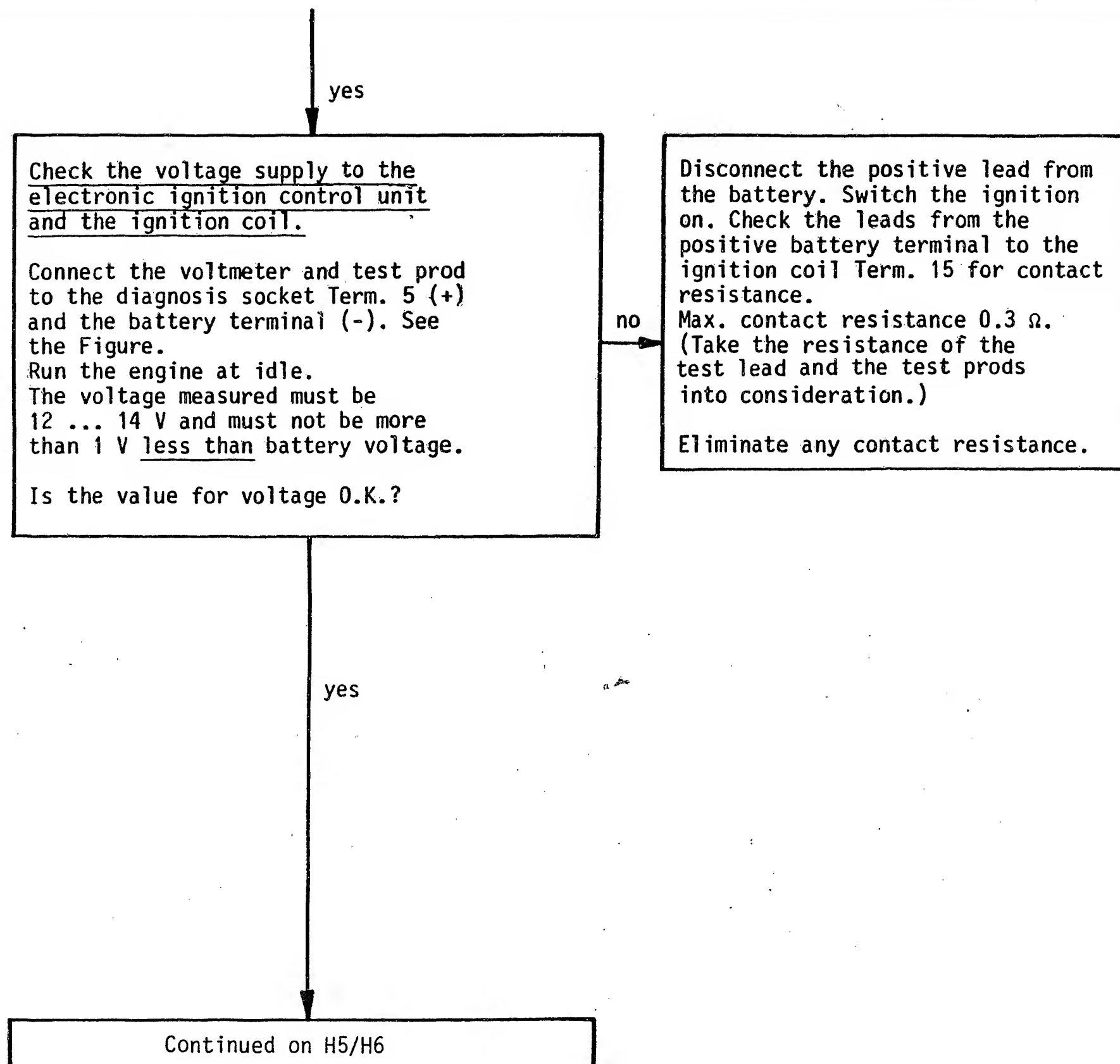
Trouble-shooting program
Mercedes-Benz



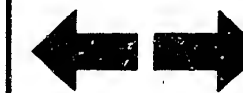
H2

Trouble-shooting program
Mercedes-Benz





Diagnosis socket
e.g. vehicle model 124

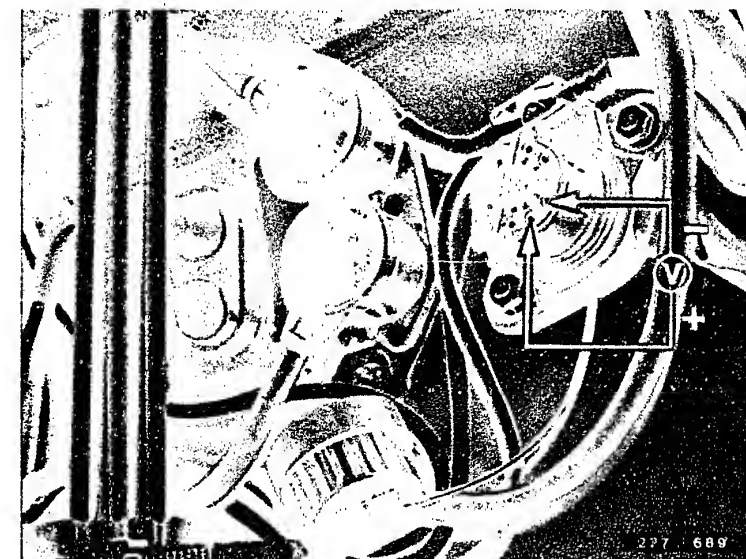


yes

Check peak-coil-current cut-off.
Connect voltmeter with test prods to diagnostic socket term. 5 (+) and term. 4 (-).
See picture.
Switch the ignition on. For approx. 1 sec. the voltmeter can move a short distance.
The voltmeter must return to 0 V.
Is the value for voltage (0 V) O.K.?

no

Take out and replace the electronic ignition control unit and the ignition coil.



Diagnosis socket
e.g. vehicle model 124

yes

Continued on H7/H8

H5

Trouble-shooting program
Mercedes-Benz



H6

Trouble-shooting program
Mercedes-Benz



yes

Test primary voltage.
(If MOT series available).
Connect oscilloscope (e.g. MOT 201) together
with pulse shaper 1 684 463 154 to ignition
coil according to operatin instructions.
Note: Incorrect reading without pulse shaper.
Allow engine to idle.
Measured primary voltage must be 280-360 V.
See graph.

Voltage correct?

yes

If all test steps were OK but the customer
complaint has not yet been eliminated, try
installing the prescribed ignition coil.
If the customer complaint is still not
eliminated, re-install the "old" ignition
coil.

Ignition system OK.

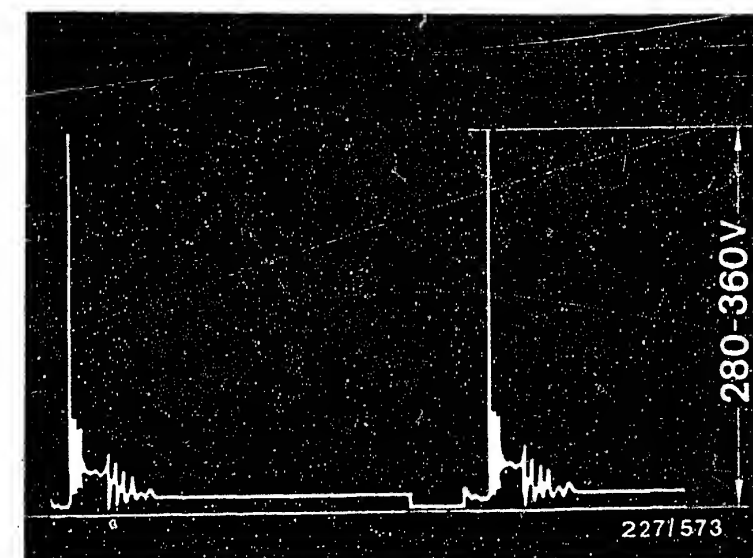
Testing completed.

Testing starting on H 9 no longer necessary.

Note:

Possibility of defects in fuel system, or
engine mechanically out of order.

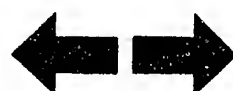
no Take out and replace the electronic
ignition control unit.



H7

Trouble-shooting program

Mercedes-Benz



H8

Trouble-shooting program

Mercedes-Benz



No primary voltage or no ignition spark.

(Continued from G9/G10)

yes

Check insulation of pulse generator.

Disconnect the electronic ignition control unit plug and connect an ohmmeter to Term. 7 and the battery terminal (-). See the Figure at the top. The ohmmeter must read $\infty \Omega$. Is the value for resistance O.K.?

no

If the value for resistance is approx. 0Ω , take out and replace the pulse generator. See the Figure at the bottom.

yes

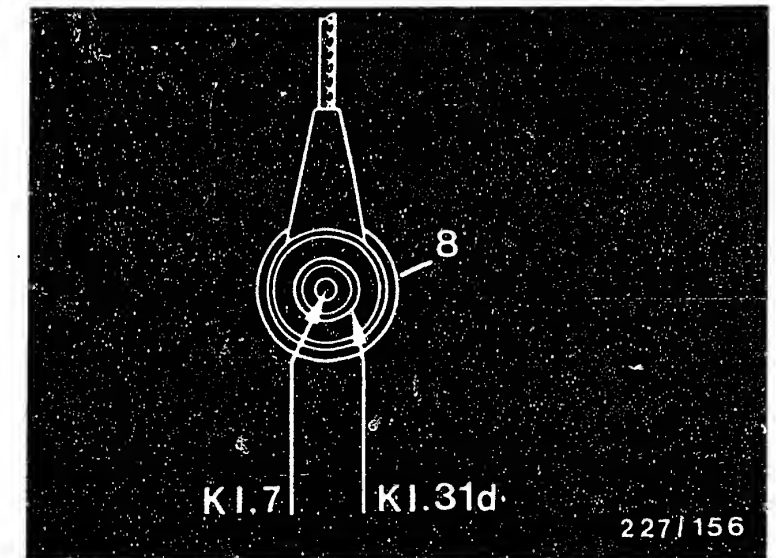
Check the internal resistance of the pulse generator.

Disconnect the electronic ignition control unit plug and connect an ohmmeter to Term. 7 and Term. 31d. See the Figure at the top. The ohmmeter must read $680 \dots 1200 \Omega$. Is the value for resistance O.K.?

Take out and replace the pulse generator. See the Figure at the bottom.

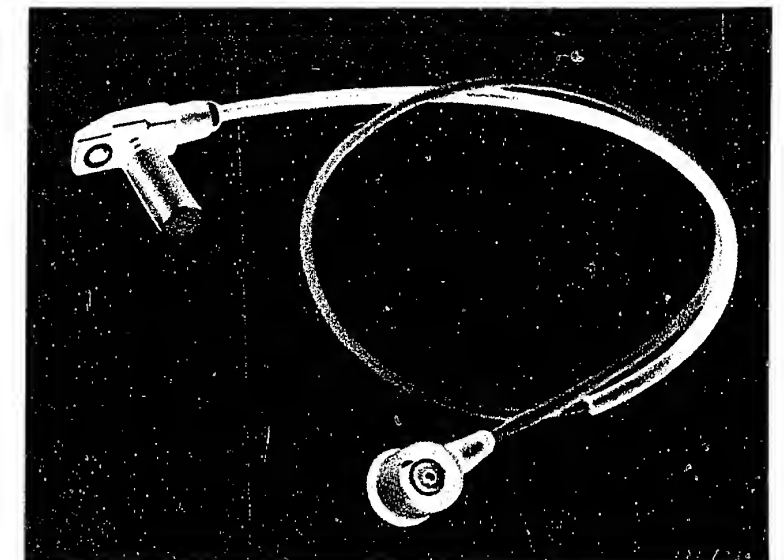
yes

Continued on H11/H12



8=Electronic ignition control unit plug - pulse generator

Pulse generator



H9

Trouble-shooting program

Mercedes-Benz



H10

Trouble-shooting program

Mercedes-Benz



yes

Check the voltage supply to the electronic ignition control unit.

Disconnect the electronic ignition control unit plug and connect a voltmeter to Term. 15 (+) and Term. 31 (-). See the Figure. Switch the ignition on. The voltmeter must show battery voltage.

Is the value for voltage O.K.?

no

Check the leads and connections from the ignition and starting switch to the electronic ignition control unit plug Term. 15, including the ground lead Term. 31, for a break. Eliminate any break.

yes

Check the primary circuit.

Disconnect the electronic ignition control unit plug and connect a voltmeter to Term. 16 (+) and Term. 31 (-). See the Figure. Switch the ignition on. The voltmeter must indicate battery voltage.

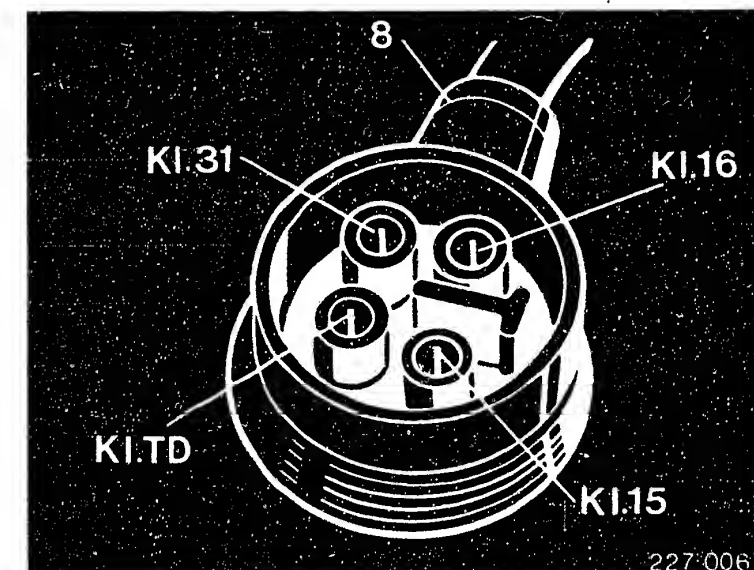
Is the value for voltage O.K.?

no

Check the supply lead from the ignition and starting switch to the ignition coil Term. 15, the primary winding of the ignition coil, and the lead from the ignition coil Term. 1 to the electronic ignition control unit plug Term. 16, including the ground lead, Term. 31, for a break. Eliminate any break.

yes

Continued on H13/H14



8=Electronic ignition control unit plug



yes

Check the ignition coil.

Remove the protective cap from the ignition coil.

Primary ignition coil (Term. 15 and 1)
0.30...0.60Ω (Take resistance of measuring
lead and test prods into consideration.)

Secondary ignition coil (Term. 1 and 4)
7.3...13.2 kΩ.

Are values for resistance O.K.?

no

Replace ignition coil.

yes

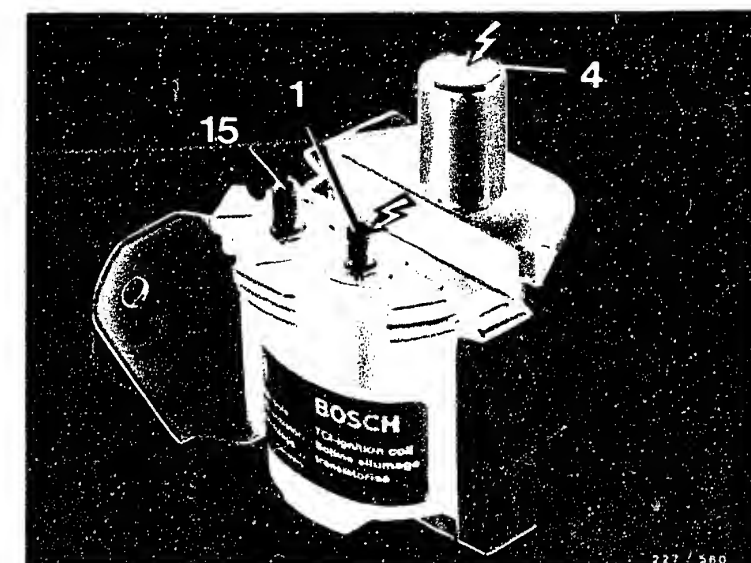
If all test steps were OK but there is still
no primary signal or ignition spark, try
installing the prescribed ignition coil.
If primary voltage or ignition spark still
not present, re-install the "old" ignition
coil and replace EI control unit.

Testing completed.

Tests on G.11 not necessary.

Note:

If customer complaint still not eliminated,
there may be defects in the fuel system, or
the engine may be mechanically out of order.



High voltage arrows:
Warning, 400 V ... 25 kV!

H13

Trouble-shooting program

Mercedes-Benz



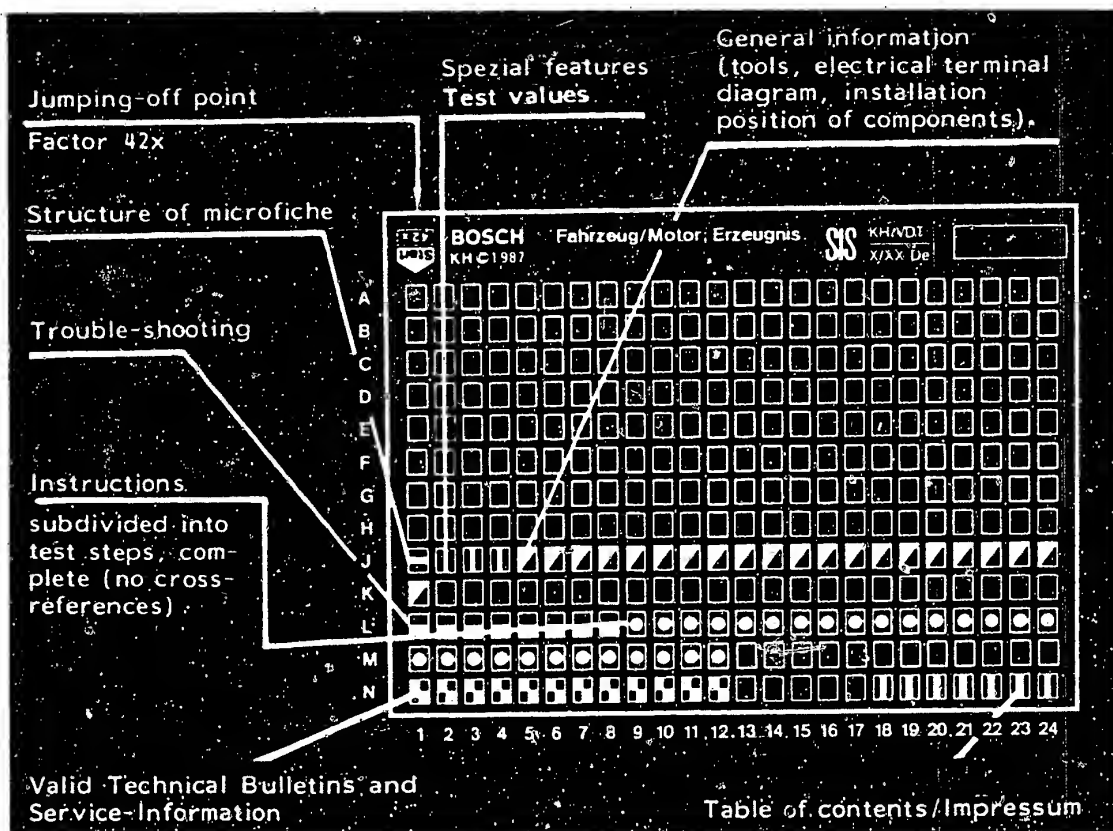
H14

Trouble-shooting program

Mercedes-Benz



Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

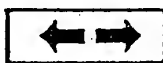
E16	Product/component/test step
	Vehicle/engine

↑ Coordinate

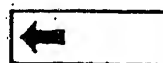
3. Limits of section



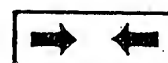
Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

J1

Trouble-shooting program



1. Special features

Mercedes Benz 300E 6-cyl. engine 103.983, 1985 year of manufacture, USA, Japan, AUS

300 SE 6-cyl. engine 103.981, 1985 year of manufacture, Japan, AUS

Equipped with:

EZ control unit 0 227 400 5.. (with current limitation) or Siemens control unit

(Daimler Benz AG service part)

Note: Bosch and Siemens control units are interchangeable.

Ignition coil 0 221 5..

2. Test specifications

Primary ignition coil	0.3 ... 0.6 Ω	L11
Secondary ignition coil	7.3 ... 13.2 Ω	

Coolant-temperature sensor	+ 20°C	2.1 ... 2.9 k Ω	L17
	+ 30°C	1.4 ... 2.0 k Ω	
	+ 80°C	280 ... 370 Ω	
	+ 90°C	210 ... 280 Ω	
	+ 100°C	160 ... 215 Ω	



Spark advance without vacuum

Fuel	Countries	Engine speed min ⁻¹ °kW BTDC
Super lead-free	USA, Japan	3200 27 - 31°
Regular lead-free	Australia	3200 21 - 25°

L15



L19

In order to prevent incorrect measurement, always carry out testing per coordinates given.

J3

Test specifications

Mercedes-Benz



Single balancing plug
for vehicle version: USA, Japan 750 Ω
Australia 220 Ω

L21

Voltage supply, 12 ... 14 V
EZ control unit and max. 1V
ignition coil when below U_B
engine idling

M1

Primary voltage when 280 ... 360 V
engine idling

M5

Internal resistance, 680 ... 1200 Ω
pulse generator

M7

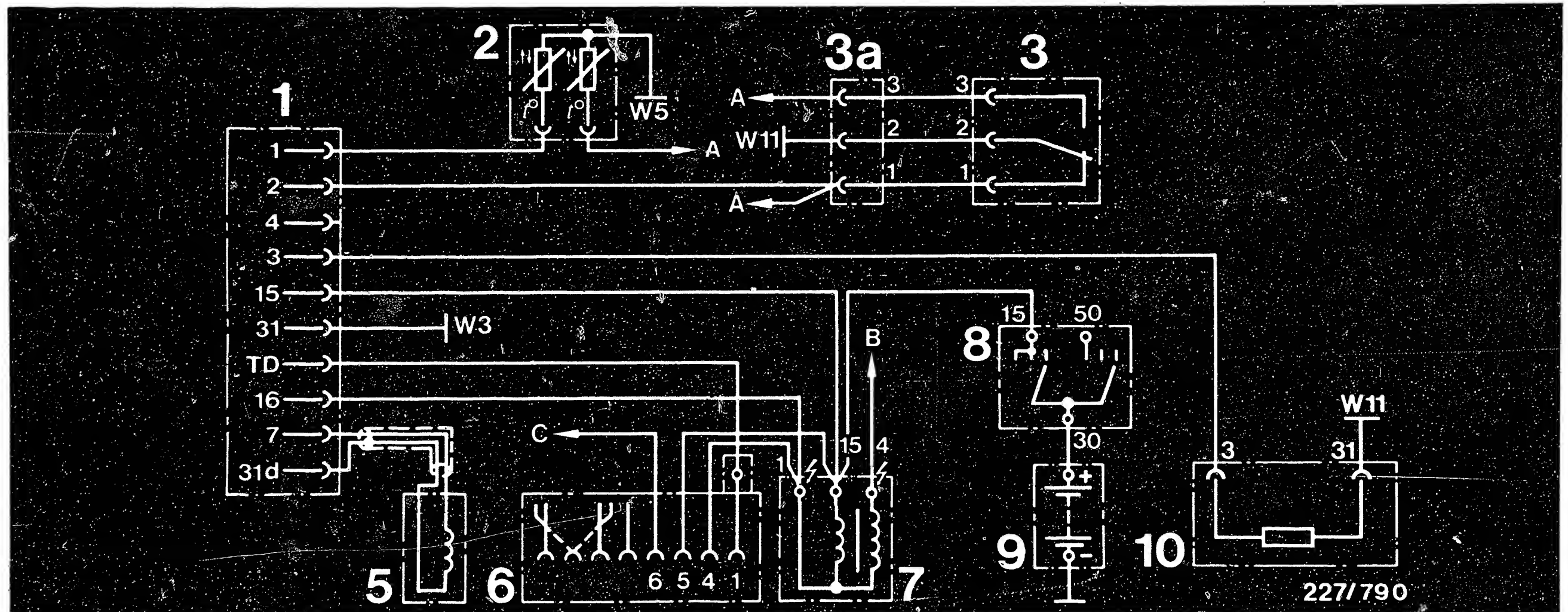
Insulation, pulse $\infty \Omega$
generator

For setting values for idle speed, exhaust, etc., see
SIS microcard for jetronic.

J4

Test specifications
Mercedes-Benz





Danger arrows:
Warning: 400 V ... 25 kV

- 1 = Electronic-ignition control unit
- 2 = Coolant temperature sensor (double NTC)
- 3 = Throttle-valve switch
- 3a = Throttle-valve switch plug connector

- 5 = Pulse generator
- 6 = Diagnostic socket
- 7 = Ignition coil
- 8 = Ignition/starting switch
- 9 = Battery
- 10 = Trimming plug
- USA, Japan = 750 Ω
- AUS = 220 Ω

- A = to KE-Jetronic control unit
- B = to high-voltage distributor
- C = Plug connector engine term. 30

- W 3 = Ground, wheel housing front left (ignition coil)
- W 5 = Ground, engine
- W11 = Ground, engine (electric lead screwed on)

3. Electrical terminal diagram

J5

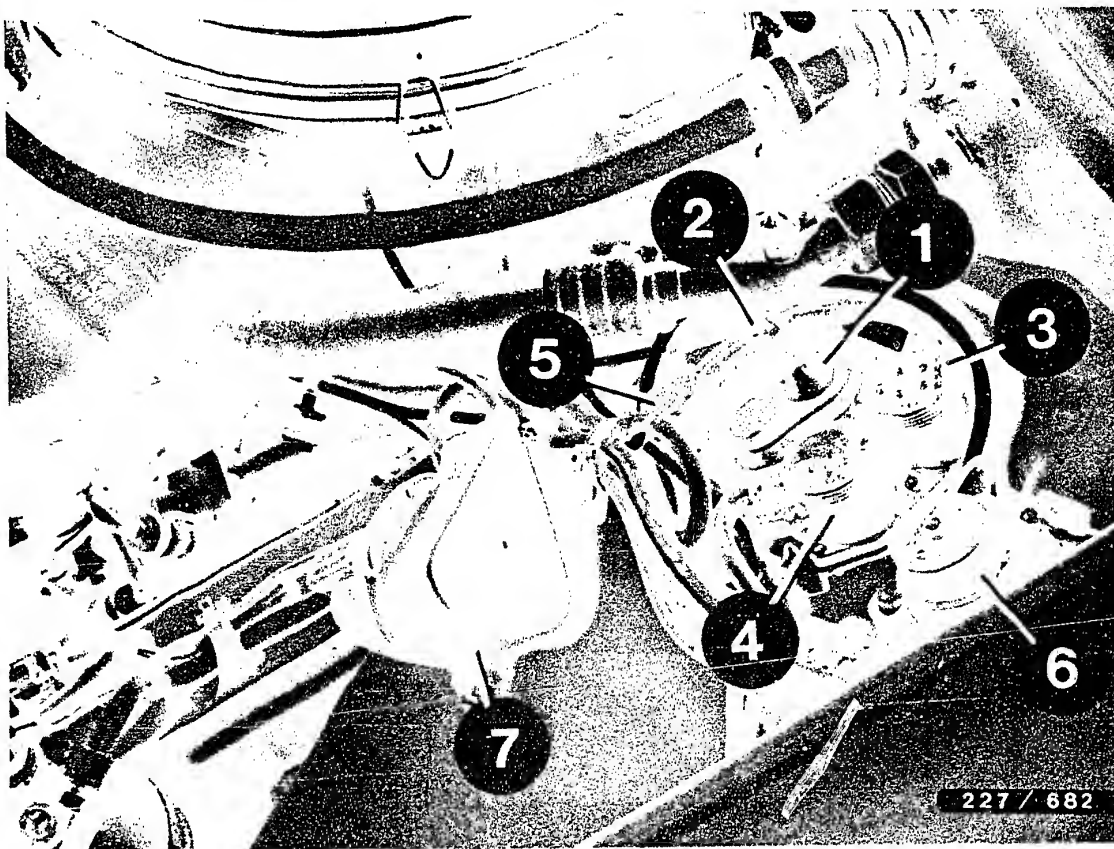
Electrical terminal diagram
Mercedes-Benz



J6

Electrical terminal diagram
Mercedes-Benz



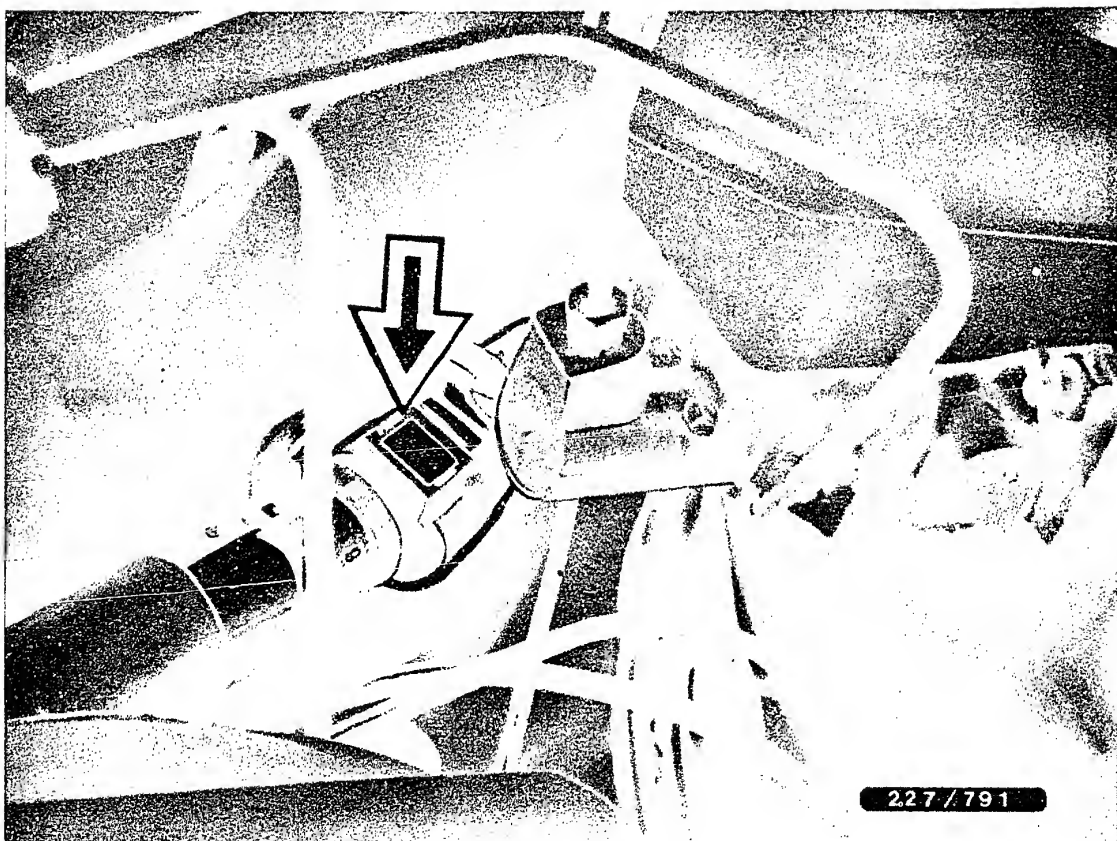


- 1 = Electronic ignition control unit
e.g. vehicle model 124
- 2 = Vacuum hose
- 3 = Quadruple plug - power supply
- 4 = Quadruple plug - sensor
- 5 = Coaxial plug - pulse generator
- 6 = Diagnostic socket
- 7 = Plastic ignition coil with protective cover

4. Installation position of components

Electronic-ignition control unit, diagnostic socket and ignition coil are situated on the wheel housing on the left-hand side as viewed in the forward direction of travel.

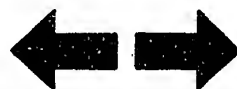


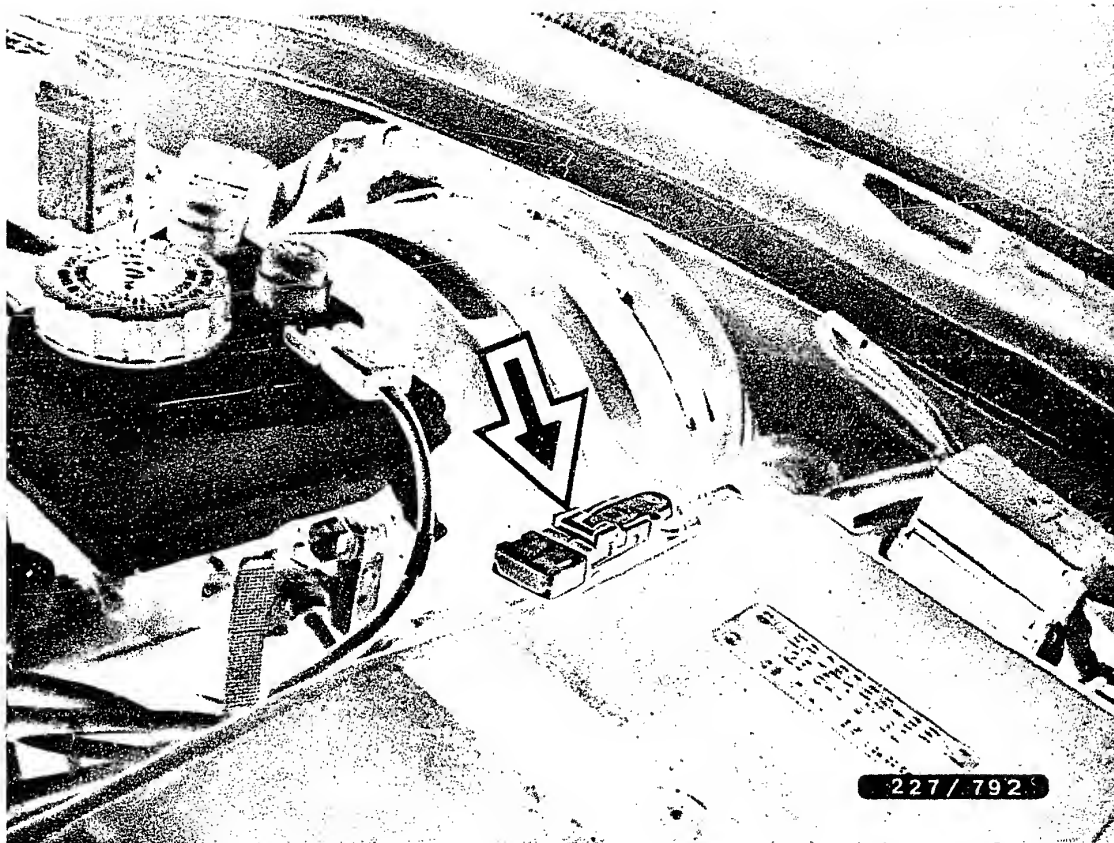


Arrow = Single balancing plug, ignition
Vehicle model 124

J8

Installation position of components
Mercedes-Benz



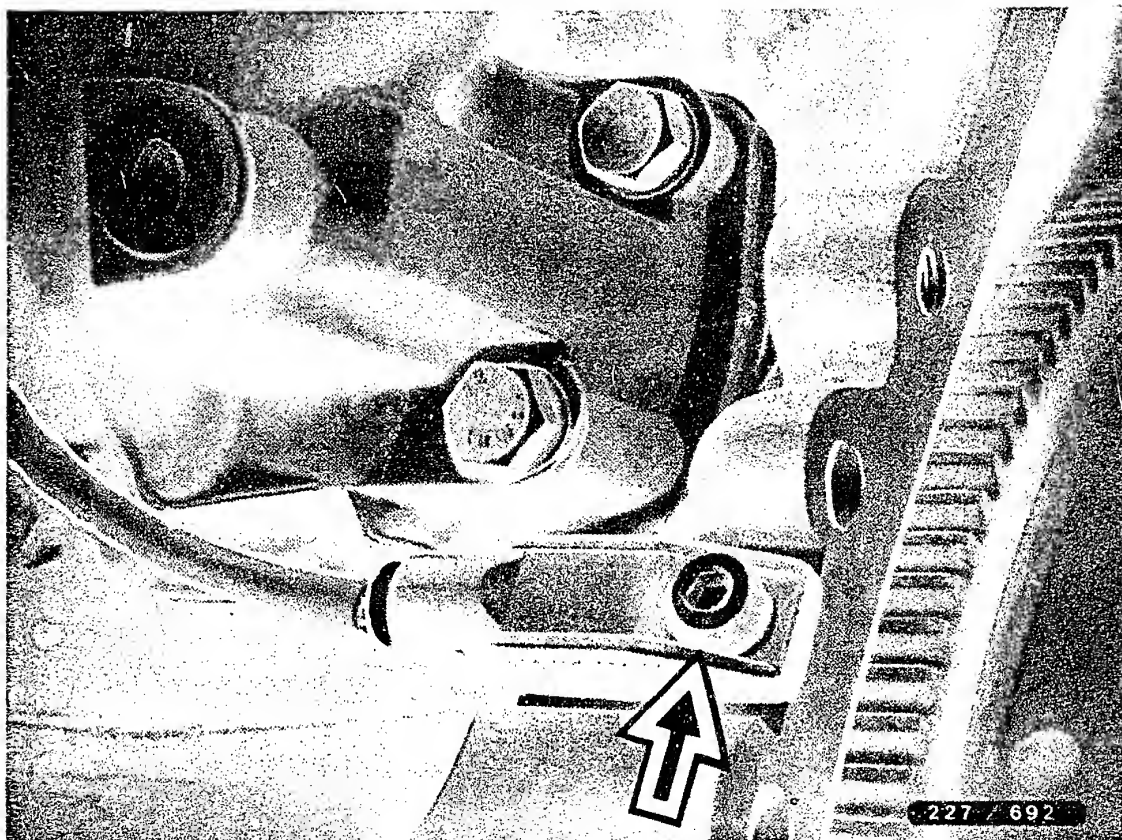


Arrow = Single balancing plug, ignition
Vehicle model 126

J9

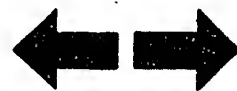
Installation position of components
Mercedes-Benz

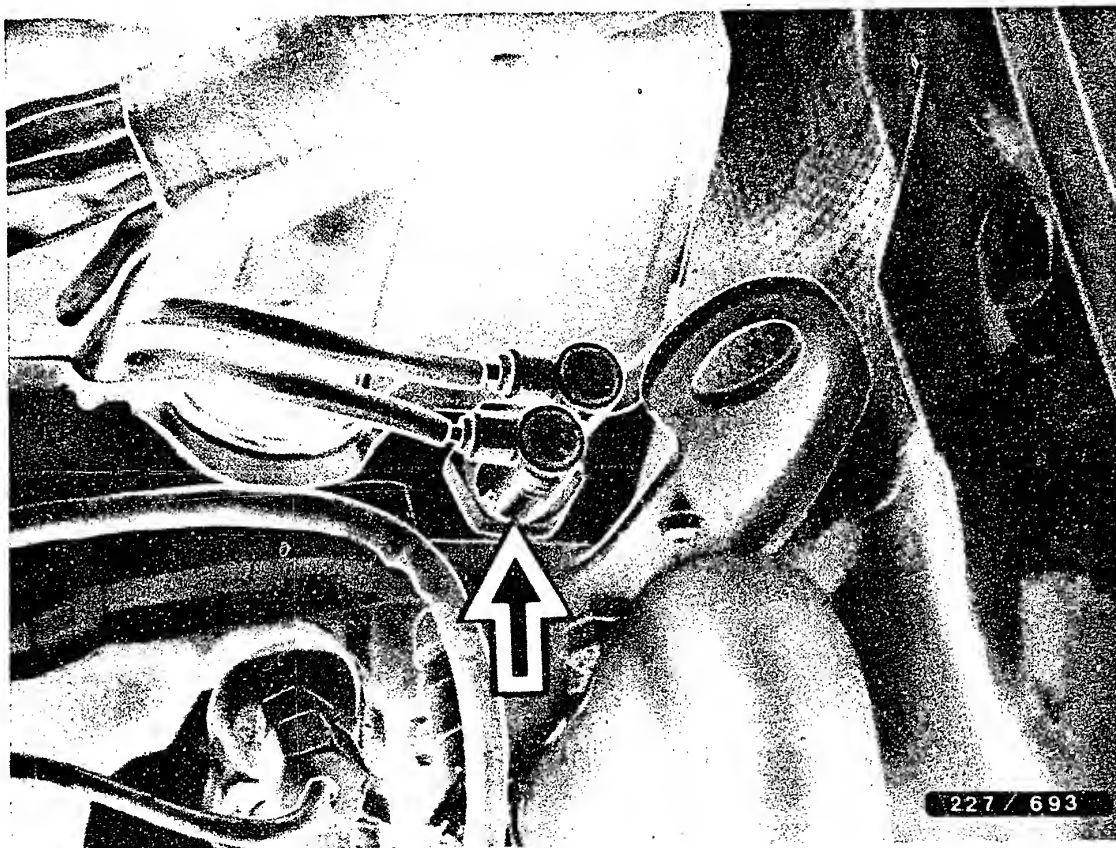




Arrow = Pulse generator

The pulse generator is located on the engine block on the left, looking in the direction of forward vehicle travel.





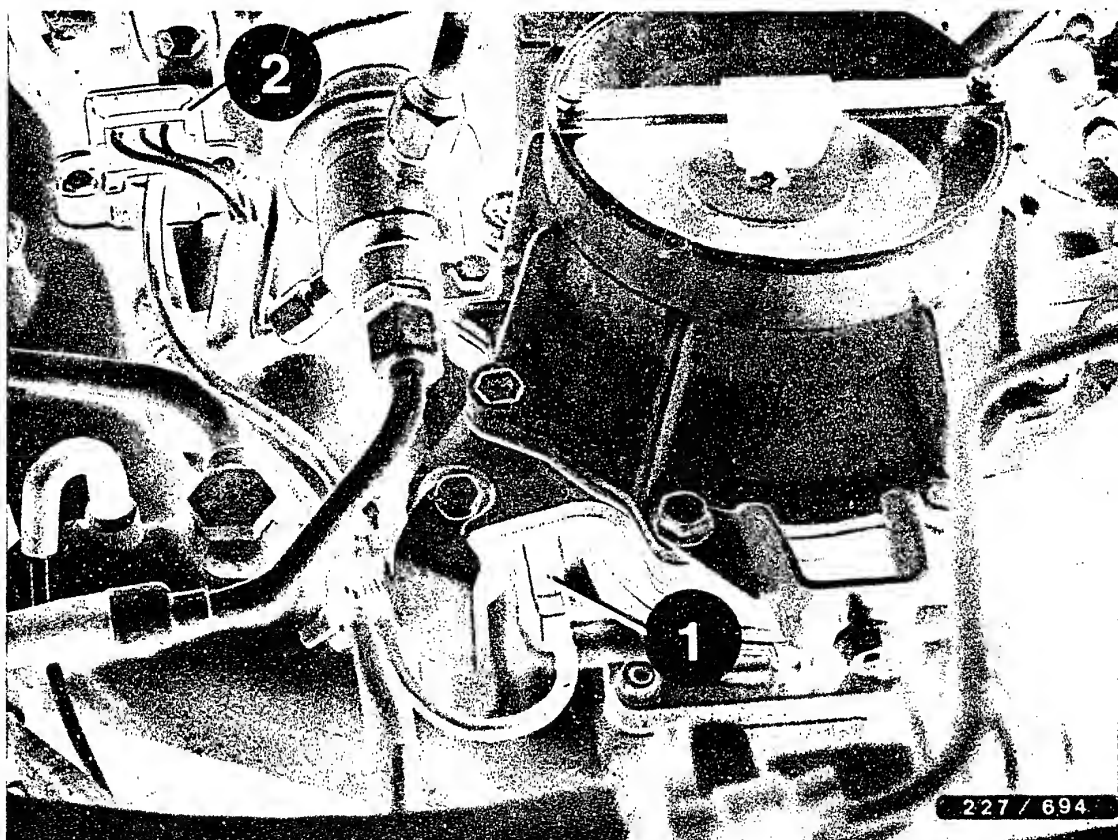
Arrow = Coolant temperature sensor (double NTC)

The coolant temperature sensor is situated on the side of the cylinder head.

J11

Installation position of components
Mercedes-Benz





1 = Throttle-valve switch

2 = Plug connection from the throttle valve switch

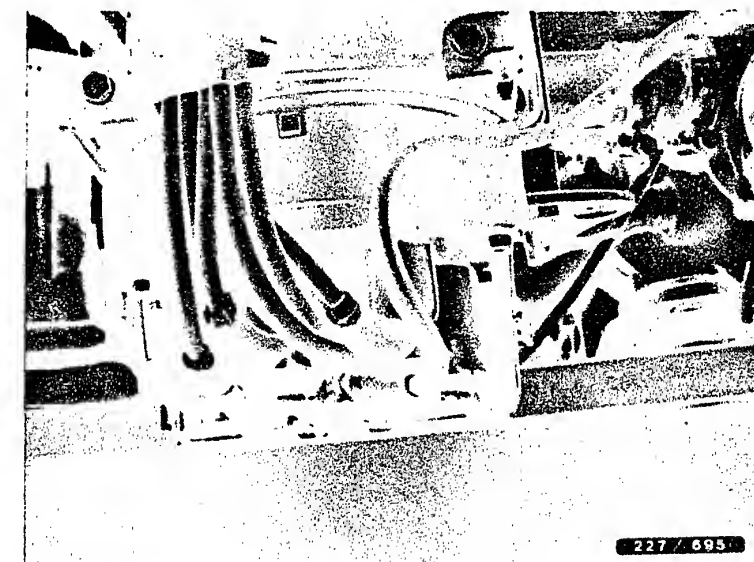
The throttle-valve switch is located on the throttle-valve assembly.



The high-voltage distributor (see top picture) is mounted on the front cover of the cylinder head and is driven directly by the camshaft by the driver (see bottom picture, arrow).

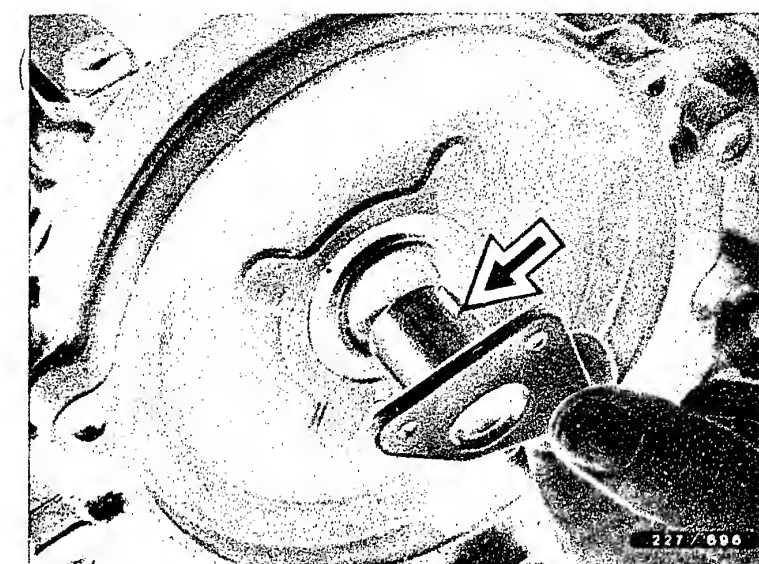
The ignition cables on the distributor cap should be mounted in the sequence 1, 3, 6, 2, 4, 5 (proper routing of ignition cables).

See next Coordinate for information on removal.



High- voltage distributor

Driver



J13

Installation position of components
Mercedes-Benz



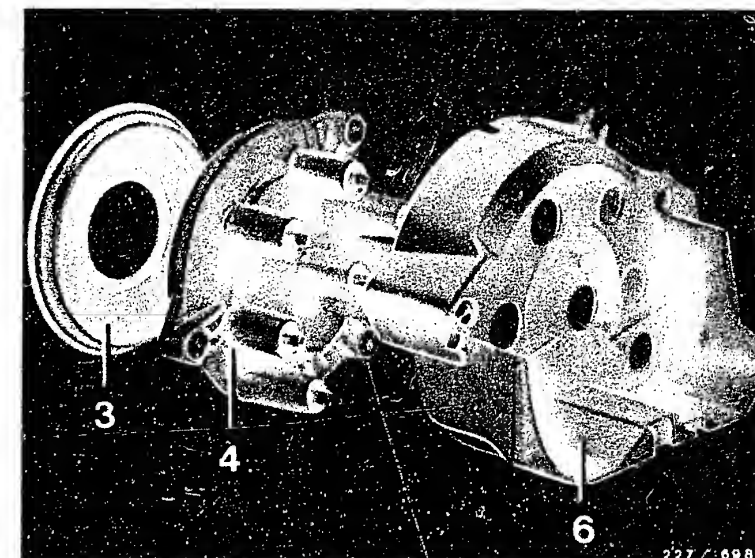
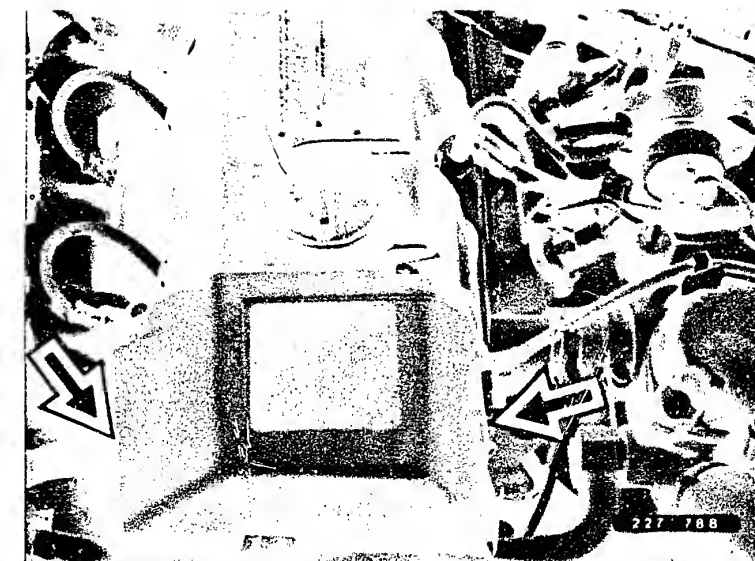
J14

Installation position of components
Mercedes-Benz



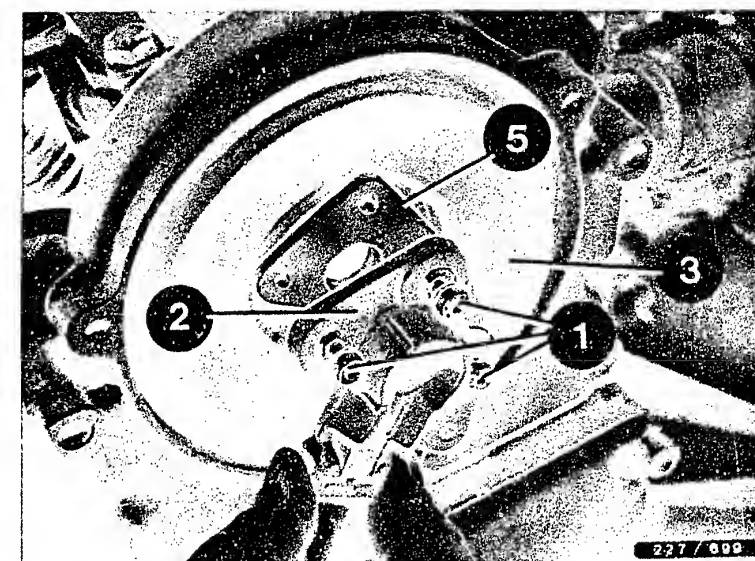
How to remove high-voltage distributor

Unclip hood at the sides (see arrows, top picture) and pull upward.



Key to picture

- Item 1 = Fastening screws
- Item 2 = Distributor rotor
- Item 3 = Sealing disc
- Item 4 = Distributor cap
- Item 5 = Driver
- Item 6 = Screening cover



J15

Installation position of components
Mercedes-Benz



J16

Installation position of components
Mercedes-Benz



5. Required test equipment and aids

Motortester e.g.	MOT 201	0 684 000 201
Pulse shaper (required for measuring the primary voltage with MOT 201, 202, 206 and 400)		1 684 463 154
Adapter lead for the diagnosis socket		1 684 463 094
Spark gap e. g. ignition coil and condenser tester	EFAW 106 A	0 681 100 001
or single spark gap	EF 1177/7	1 684 531 000
5 k Ω sleeve-type suppressor		0 356 500 001
Ohmmeter	ETE 014.00	0 684 101 400
or e. g.	Pontava Wh2	commercially available
Voltmeter e.g.	ETE 014.00	0 684 101 400
Thermal conduction paste		5 942 860 003
Test prod, black		1 684 485 034
Test prod, red (for correct connection of test equipment to plug connectors)		1 684 485 035



6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts of terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

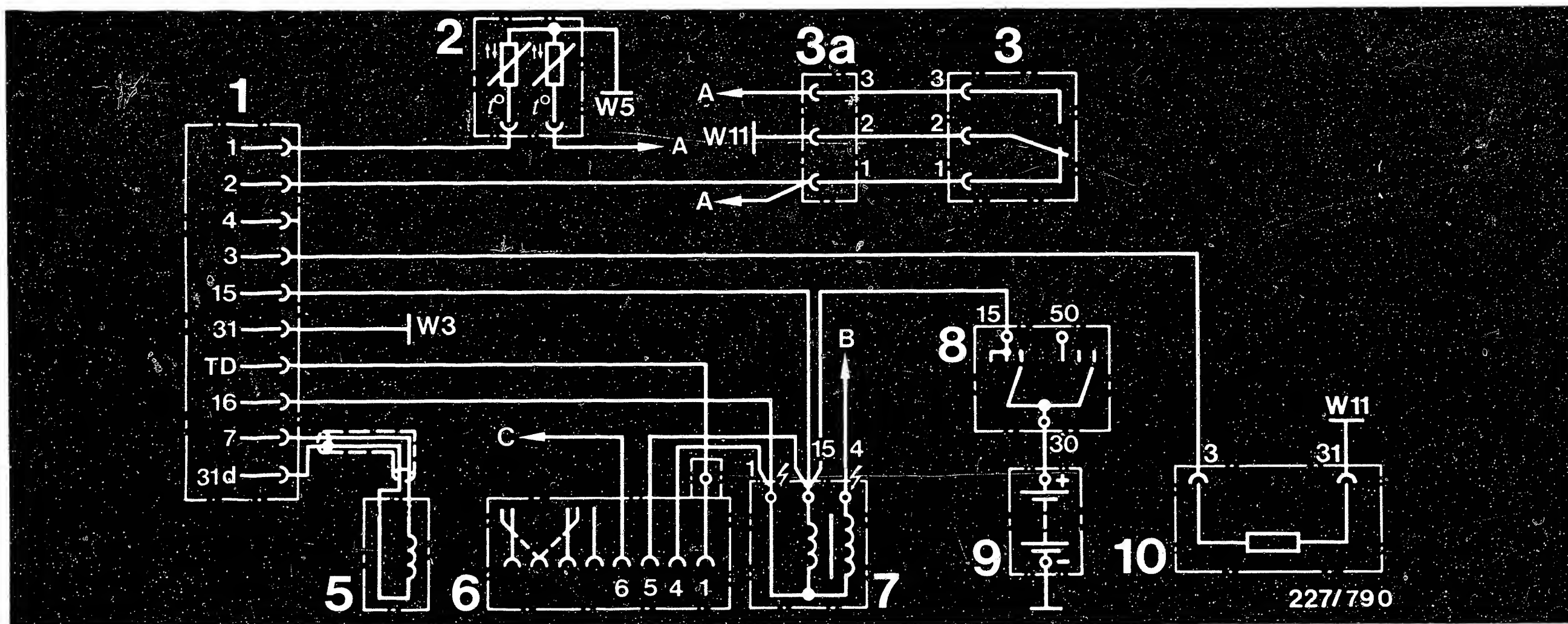
The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

- Connecting of engine test equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc.).

If, while testing the ignition system or during adjustment work on the engine (e.g. KE-Jetronic), it becomes necessary to switch on the ignition (switch on ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

The danger of accident exists, therefore, not only on the individual assemblies of the ignition system (e. g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e. g. tachometer connection, diagnostic plug), at plug-in connections and test equipment.





Danger arrows:
Warning: 400 V ... 25 kV

1 = Electronic-ignition control unit
2 = Coolant temperature sensor
(double NTC)
3 = Throttle-valve switch
3a = Throttle-valve switch
plug connector

5 = Pulse generator
6 = Diagnostic socket
7 = Ignition coil
8 = Ignition/starting switch
9 = Battery
10 = Trimming plug
USA, Japan = 750 Ω
AUS = 220 Ω

A = to KE-Jetronic
control unit
B = to high-voltage
distributor
C = Plug connector
engine term. 30

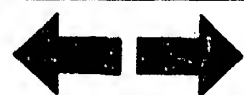
W 3 = Ground, wheel
housing front left
(ignition coil)
W 5 = Ground, engine
W11 = Ground, engine
(electric lead
screwed on)

Electrical terminal diagram

The hazard locations are identified with high voltage arrows using, as an example, the connection diagram for an electronic ignition system.

J19

Accident hazard
Mercedes-Benz



J20

Accident hazard
Mercedes-Benz



7. Incorrect indication of engine speed, dwell angle and ignition point

In the case of ignition systems with control unit 0 227 400 5.. or control units from Siemens (electronic ignition) with current limitation, there can be an incorrect reading for engine speed, dwell angle, and ignition timing on the test instruments.

For further details see coordinates N 7 - N 11.

J21

Incorrect reading on test instruments

Mercedes-Benz



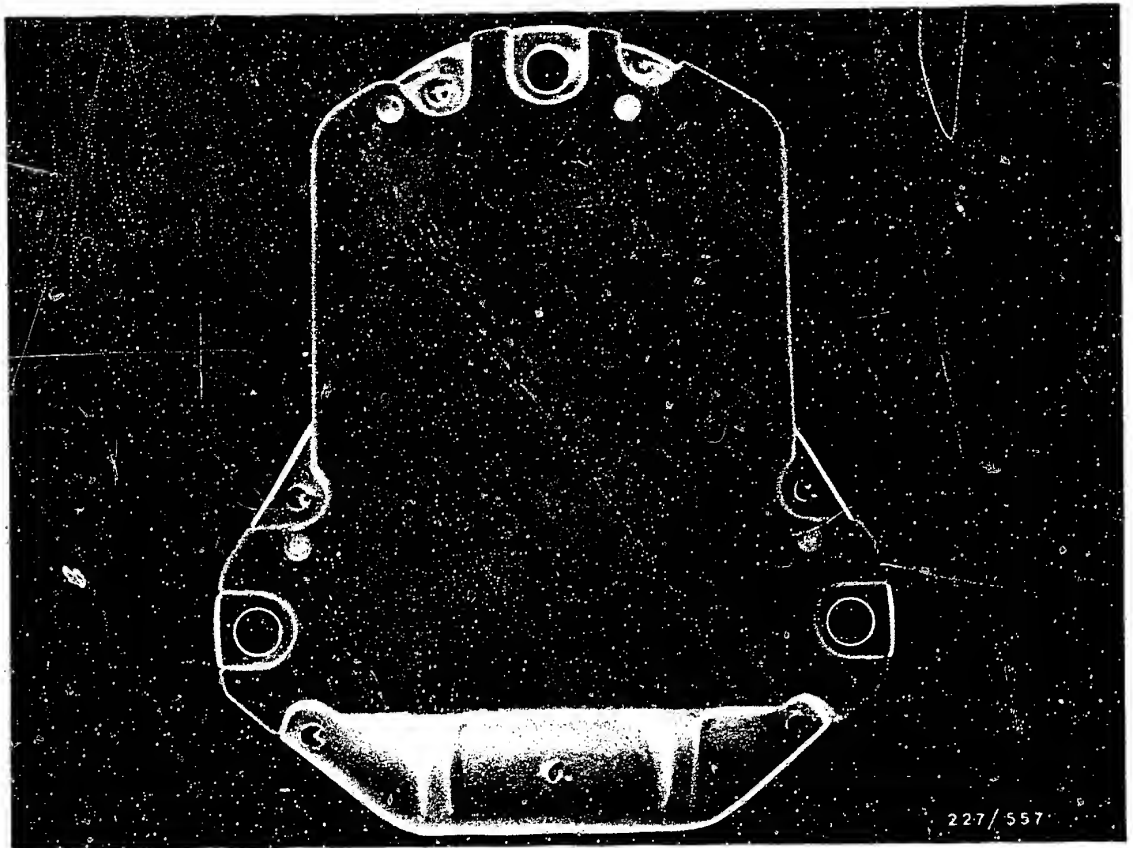
8. Important vehicle information

- Resistance measurements must only be performed with the ignition switched off or with the battery disconnected (measuring instrument defective).
- For a compression test, disconnect the coaxial plug (pulse generator) from the electronic ignition control unit.
- Never disconnect the battery while the engine is running.
- A starting assist with more 16 Volts or with a quick-charger is not permitted.
- The specified ignition coil (see Part.No.) must not be replaced with a different ignition coil.
- No suppression capacitor must be connected to ignition coil terminal 1.
- Ignition coil terminal 1 must not be brought into contact with ground as a theft-proofing measure (ignition coil will be destroyed when ignition is switched on).
- No battery + or test lamp must be connected to ignition coil terminal 1 (the electronic ignition control unit is destroyed).
- The ignition lead from the ignition coil Term. 4 to the high voltage distributor Term. 4 must not be disconnected during operation.
- There must be no arcing from ignition coil terminal 4 to ignition coil terminal 1 and 15.
The electronic ignition control unit can be destroyed.



- If the poles are reversed on the ignition coil (Term. 1 and Term. 15) there are severe losses of ignition energy, causing missing. In addition, the electronic ignition control unit is overloaded. In order to preclude reversal of poles, the terminal studs have different diameters. (M5 and M6)
- In order to avoid destruction of the electronic ignition control unit, the secondary end of the ignition system must have interference suppression of min. 2 k Ω . The original distributor rotor must be installed with an interference suppression resistor of 1 k Ω .
- If the poles on the battery are incorrectly connected, the electronic ignition control unit and the ignition coil are destroyed.



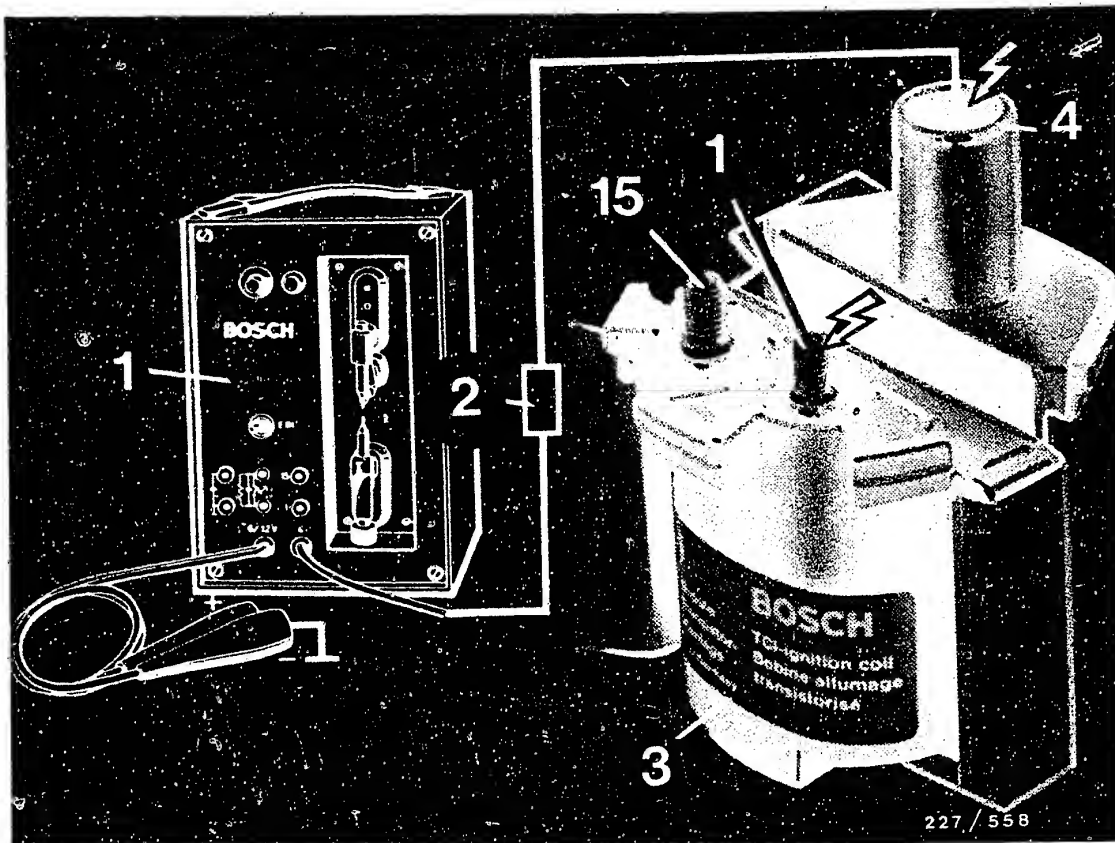


- Before putting on the electronic ignition control unit, the base plate (see the Figure, bright surface) must be coated with a heat conduction paste.

Apply thermal conduction paste only with a suitable object (screwdriver, etc.).

Do not apply thermal conduction paste to painted parts.





High voltage arrows:
Warning, 400 V ... 25 kV!

- 1 = Spark gap
- 2 = 5 k sleeve-type suppressor
- 3 = Ignition coil

- When using a spark gap - in order to prevent irreparable damage to the electronic-ignition control unit - an interference-suppression resistor of at least 2-k Ω must be connected between the spark gap and ignition coil terminal 4, e.g. sleeve-type suppressor (5 k Ω).
0 356 500 001.

K1

Important vehicle information
Mercedes-Benz



9. Trouble-shooting

9.1 How to use the trouble-shooting chart

The trouble-shooting chart starting on Coordinate L 3 contains customer complaint (fault symptom), cause of trouble, test instructions and coordinate references.

The possible cause of the fault should be selected from the trouble-shooting chart in accordance with the customer complaint (fault symptom).

If the cause of the fault is not clear, start testing with the detailed, self-contained trouble-shooting program beginning on Coordinate L 9.

If the cause of the fault is clear from the trouble-shooting chart, direct trouble-shooting is possible by going to the stated coordinate without having to perform the entire trouble-shooting program for each fault.

If there is no coordinate reference, trouble-shooting must be performed in accordance with the "Test instructions" column.

9.2 Procedure - trouble-shooting program

The trouble-shooting program starting on Coordinate L 9 is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The center row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and the explanations of the items in the picture.

If the questions asked in the left-hand row can be answered conclusively with "yes", then proceed to the next test down.

If the answer to the question is "no", branch to the center row and carry out the tests given there.

9.3 Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e. g. compression, valve clearance etc.). Ambient temperature/ignition system temperature 0° to 100° C (temperature has a considerable effect on measured values).

L1

Trouble-shooting

Mercedes-Benz



L2

Trouble-shooting

Mercedes-Benz



9.4 Trouble-shooting chart

Customer complaint (fault symptom)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

8. Backfiring

9. Engine becomes too hot

Cause of fault

Test instructions

Coordinates

●	●	●	●	●	●	●	●	●	Unclear	Perform detailed trouble-shooting	L 9
●	●	●	●	●	●	●	●		Spark plugs defective	Assessment by means of ignition oscilloscope or visual examination of spark plug when removed	----
●	●	●	●	●					Shunt on secondary side	Evaluation of the ignition coil, high voltage distributor, ignition harness, and spark plug by means of the ignition oscillogram or a visual inspection	----
●	●	●	●	●					Open circuit on secondary side	Assessment of ignition coil, ignition distributor, ignition harness and spark plug by means of ignition oscilloscope, or continuity test with ohmmeter	----
●									Open circuit on primary side	--	M 9
●	●	●	●	●					Ignition coil defective	-	L 11
		●	●	●	●				Interference-suppression resistors defective	Assessment by means of ignition oscilloscope or resistance measurement	----

L3

Trouble-shooting chart

Mercedes-Benz



L4

Trouble-shooting chart

Mercedes-Benz



Customer complaint (fault symptom)

L5



L6

Trouble-shooting chart (continued)

Customer complaint (fault symptom)

1. Starting motor operates, engine fails to start
2. Rough idling
3. Poor throttle response (flat spot during acceleration)
4. Insufficient engine power
5. Misfiring
6. Fuel consumption too high
7. Engine pings when accelerating
8. Backfiring
9. Engine overheats

									<u>Cause of trouble</u>	<u>Test instructions</u>	<u>Coordinates</u>
				●					Electronic ignition control unit not O.K.	---	M 5
●									Pulse generator not O.K.	---	M 7
●									Voltage supply to electronic ignition control unit not O.K.	---	M 9

L7

Trouble-shooting chart
Mercedes-Benz



L8

Trouble-shooting chart
Mercedes-Benz



9.5 Trouble-shooting program

Test primary signal. If no oscilloscope or tachometer available, check whether ignition spark across spark gap.

Remove the protective cap from the ignition coil.

Primary signal testing with oscilloscope

Connect oscilloscope to ignition coil as per operating instructions.

Start engine.

Oscilloscope must indicate a primary voltage (of any value).

Primary signal testing with tachometer

Connect tachometer to ignition coil as per operating instructions.

Start engine.

Tachometer must indicate a reading (of any value).

Ignition spark testing with spark gap

Remove H.T. ignition cable terminal 4 from ignition coil.

Connect spark gap including sleeve-type suppressor

(5 k Ω) to ignition coil.

Adjust spark gap to 5 mm.

Start engine.

There must be sparks across the spark gap.

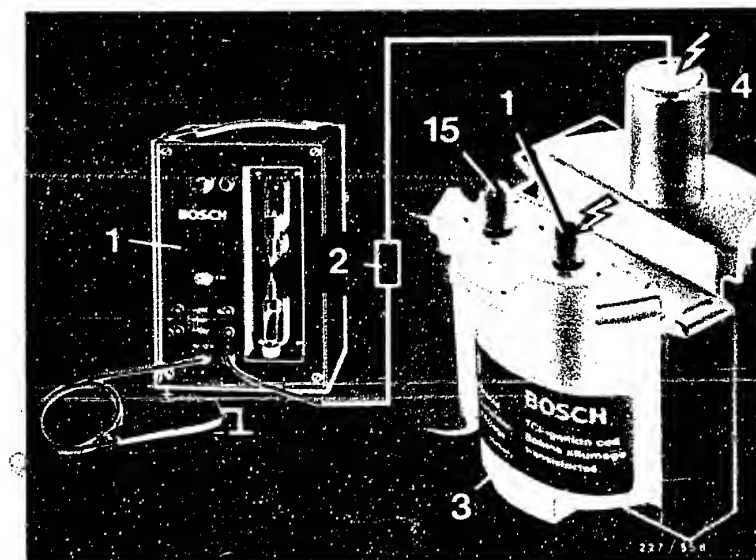
Primary signal present or ignition sparks across spark gap?

yes

Continued on L11/L12

If no primary signal or no ignition spark, continue testing at M7.

Tests from L11 onwards not necessary.



High voltage arrows:

Warning, 400 V ... 25 kV!

1 = Spark gap

2 = 5 k Ω sleeve-type suppressor

3 = ignition coil

L9

Trouble-shooting program

Mercedes-Benz

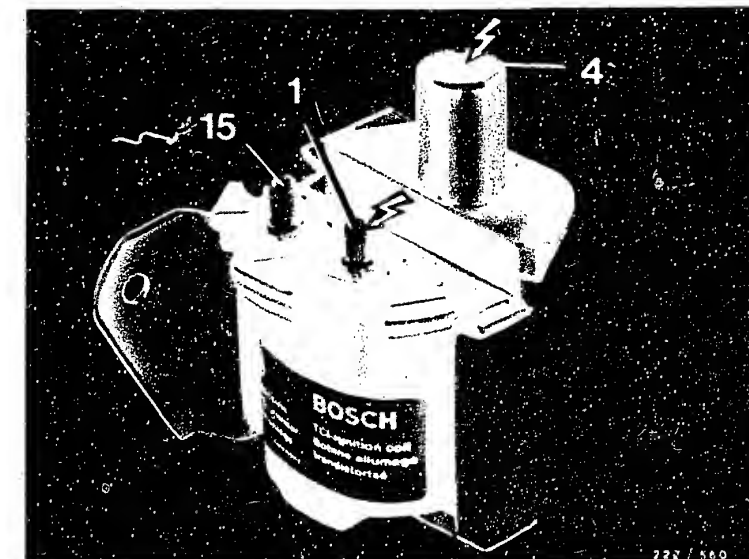
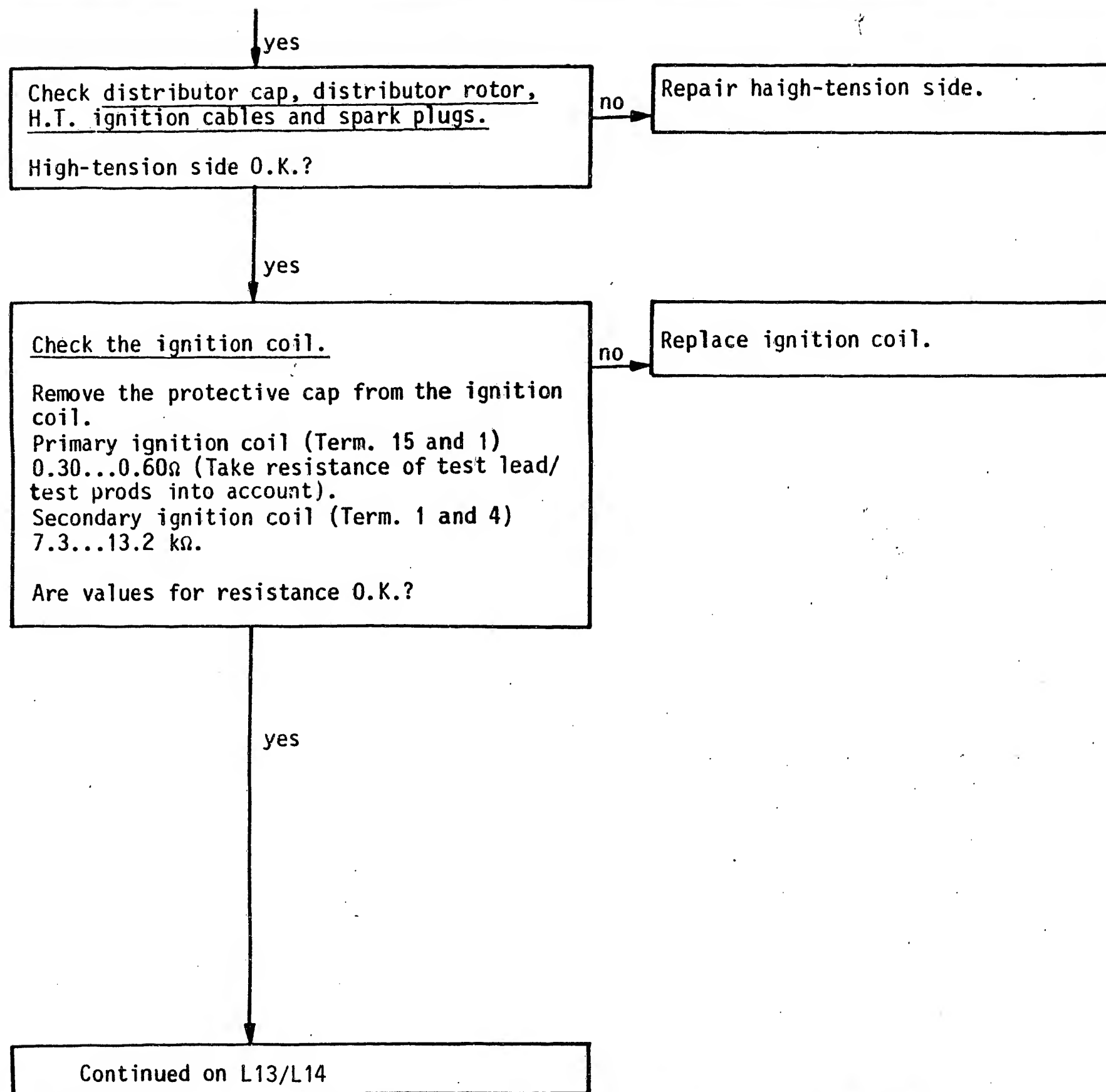


L10

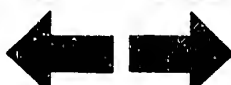
Trouble-shooting program

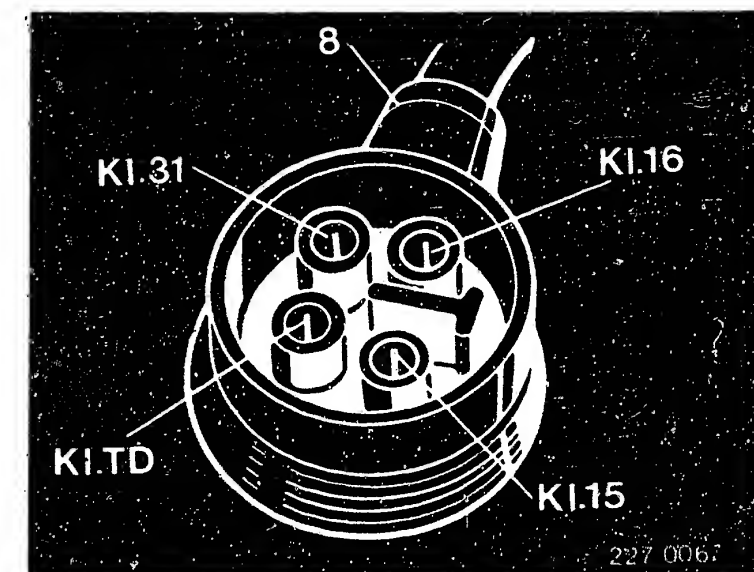
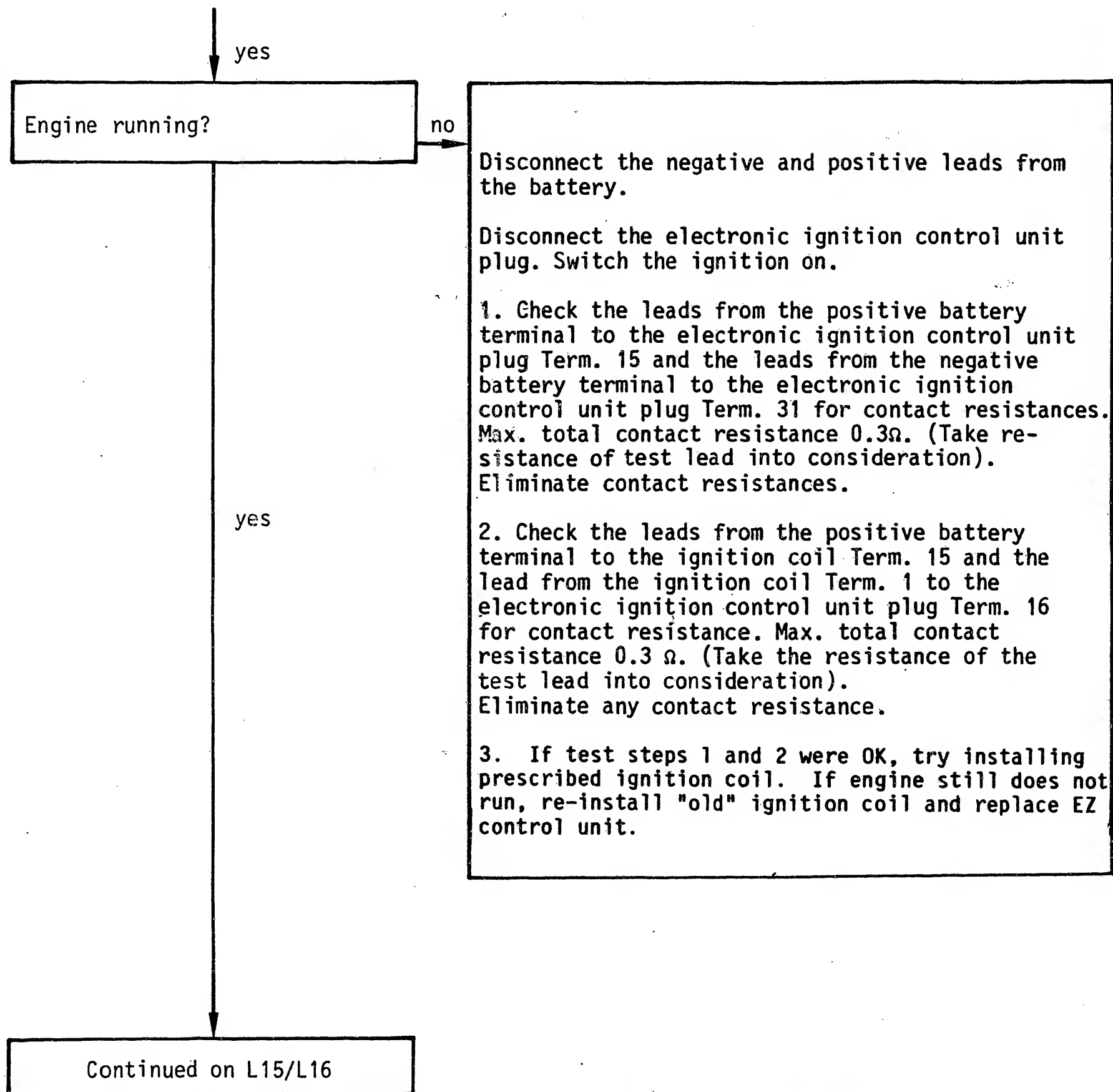
Mercedes-Benz





High voltage arrows:
Warning, 400 V ... 25 kV!





8=Electronic ignition control unit plug



yes

Check the pressure sensor

Connect the motortester to the diagnosis socket using an adapter cable. Disconnect the vacuum hose from the electronic ignition control unit. See the Figure at the top.

Take the plug connection from the throttle valve switch apart. See the Figure at the bottom. Run the engine at idle.

Take reading for timing angle.

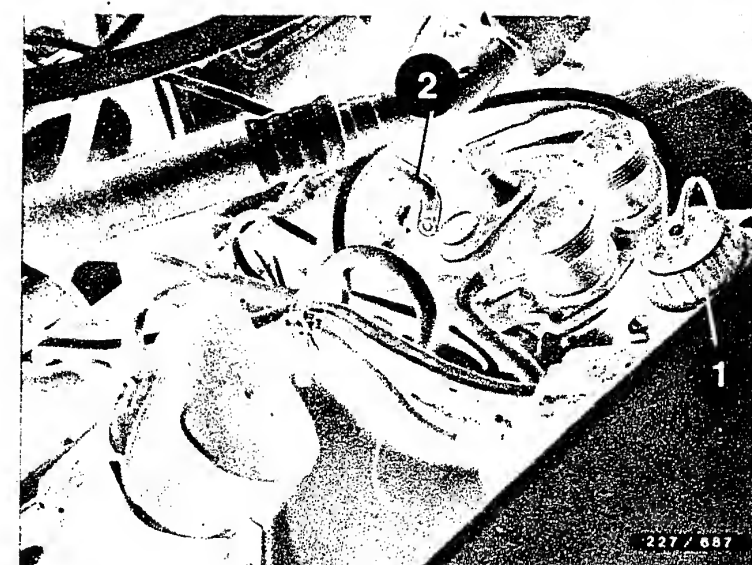
Put the vacuum hose back on the electronic ignition control unit. When this is done, the timing angle must change noticeably (in the direction "advance").

Did the timing angle change?

no

1. Check the vacuum hose from the electronic ignition control unit to the intake manifold plug connection for leaks. Eliminate any leaks.

2. If there was no leak, take out and replace the electronic ignition control unit.

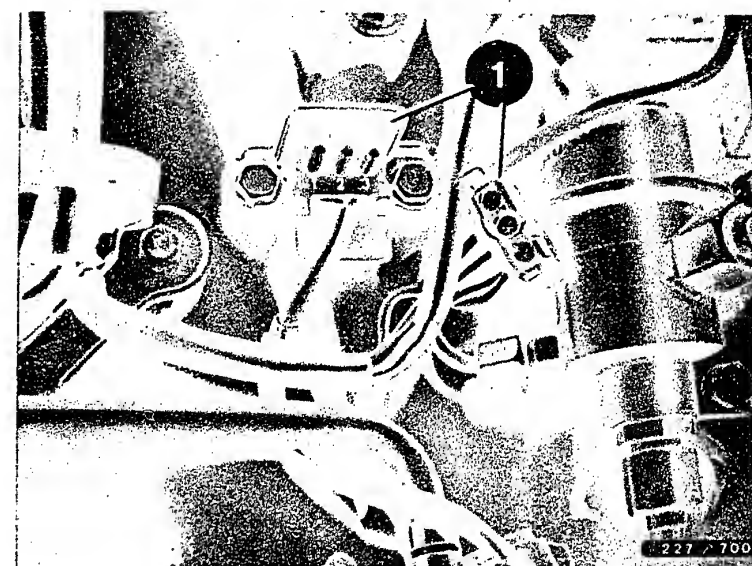


1=Diagnosis socket
2=Vacuum hose
e.g. vehicle model 124

yes

Continued on L17/L18

1=Plug connection from the throttle valve switch



L15

Trouble-shooting program
Mercedes-Benz



L16

Trouble-shooting program
Mercedes-Benz



yes

Check the coolant temperature sensor.

Warm the engine up to normal operating temperature.
Connect the motortester to the diagnosis socket using an adapter lead.
Disconnect vacuum hose from electronic-ignition control unit (not shown).
Take apart throttle-valve switch plug connector (top picture Item 1).
Run engine at idle.
Take reading for timing angle.
Disconnect the coolant temperature sensor plug (color of cable green/black).
See arrow in center picture).
When this is done, the timing angle must change.

no

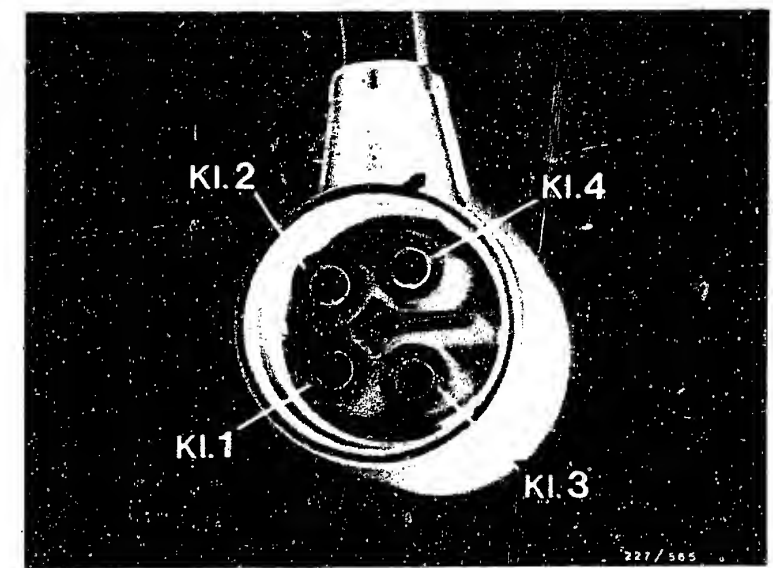
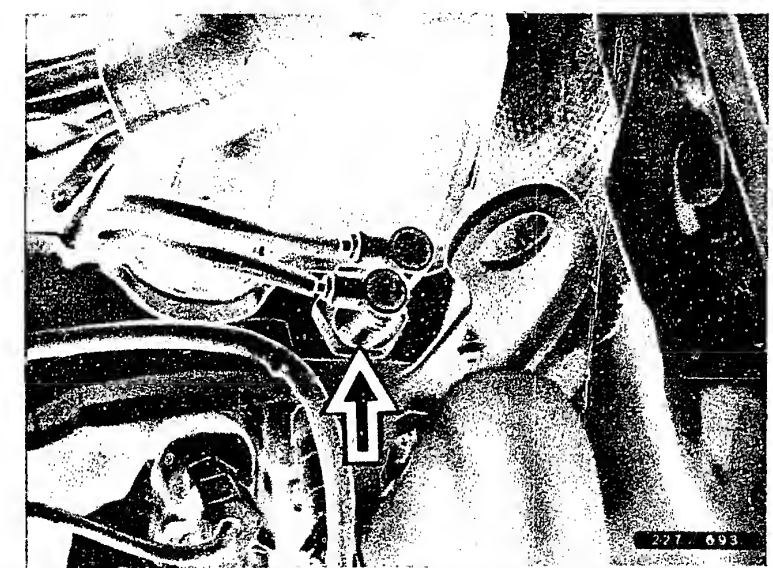
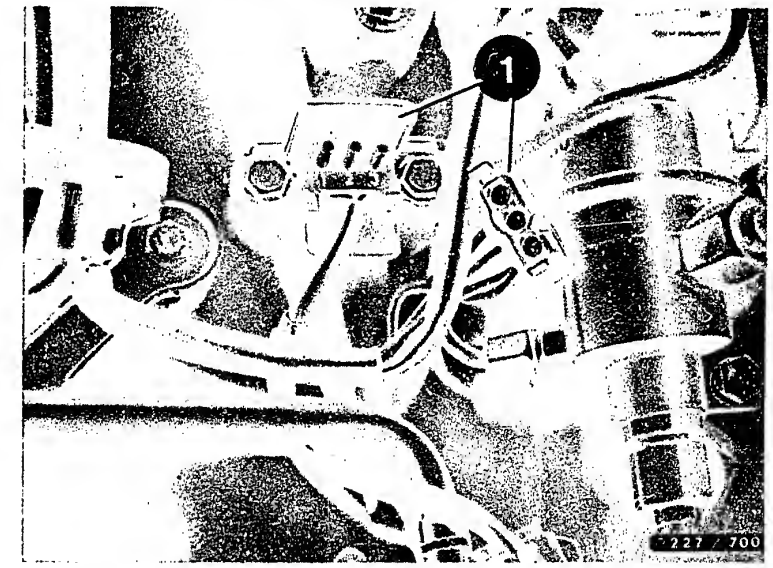
Switch the ignition off.
Disconnect the electronic ignition control plug and connect an ohmmeter to Term. 1 (see figure at bottom) and vehicle ground.
For resistances, see the table.

Coolant temperature		Resistance
+ 20°C	=	2.1...2.9 kΩ
+ 30°C	=	1.4...2.0 kΩ
+ 80°C	=	280...370 Ω
+ 90°C	=	210...280 Ω
+100°C	=	160...215 Ω

If the ohmmeter reads $\infty\Omega$, then check the lead from the coolant temperature sensor plug (color of cable green/black) to the electronic ignition control unit plug Term. 1 for continuity. Eliminate any break. If the values for resistance deviate, take out and replace the coolant temperature sensor.

yes

Continued on L19/L20



yes

Check spark advance.
Engine at operating temperature.
Motortester with adaptor lead connected to
diagnosis socket.
Vacuum hose from EZ control unit pulled off.
See upper illustration.
Plug connection from throttle-valve switch is
disconnected. See lower illustration.

Nominal spark-advance value at:

Fuel	Countries	Eng. speed min ⁻¹ / °KW BTDC
Super lead-free	USA, Japan	3200 27 - 31°
Regular lead-free	Australia	3200 21 - 25°

Spark advance OK per table?

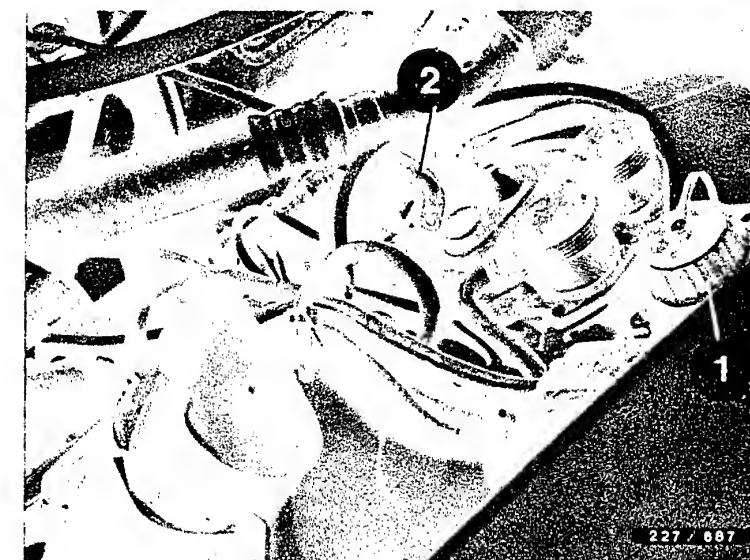
yes

Continued on L23/L24

no

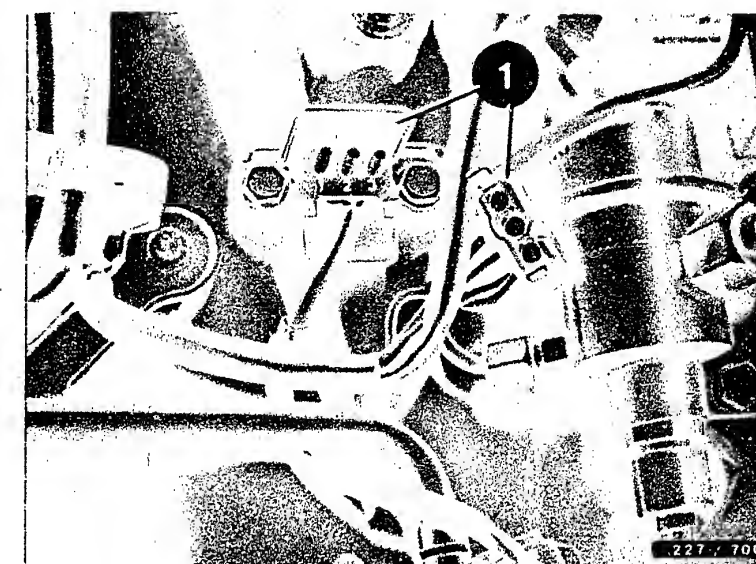
Switch off ignition

Continued on L21/L22



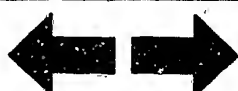
1 = Diagnosis socket
2 = Vacuum hose
e.g. vehicle model 124

1 = Plug connection from throttle-valve switch



L19

Trouble-shooting program
Mercedes-Benz



L20

Trouble-shooting program
Mercedes-Benz



↓ Continued

Disconnect EZ control-unit plug and connect ohmmeter to term. 3 and vehicle ground.

See top picture.

Resistance = USA, Japan 750 Ω

Resistance = Australia 220 Ω

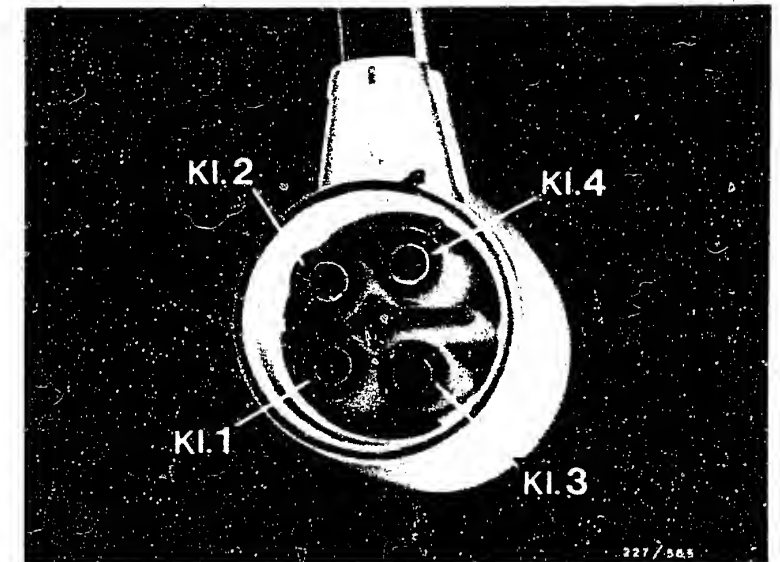
If resistance O.K.,
replace EZ control unit.

If resistance approx. 0 Ω or $\infty\Omega$,
check adjustment plug including electric leads for short circuit to ground or open circuit.
Eliminate fault.

If resistance not within tolerance, replace adjustment plug.

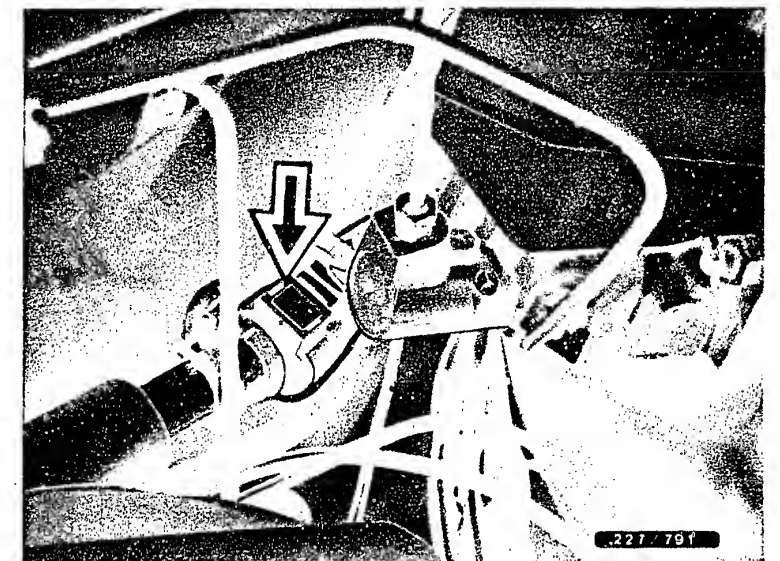
yes

Continued on L23/L24



EZ control-unit plug

Adjustment plug e.g. vehicle type 124



L21

Trouble-shooting program
Mercedes-Benz



L22

Trouble-shooting program
Mercedes-Benz



yes

Check throttle-valve switch idle contact.
Switch off ignition.
Disconnect KE-Jetronic control-unit plug.
See arrow, top picture, e.g. vehicle type 124.
Disconnect EZ control-unit plug and connect ohmmeter to term. 2 and vehicle ground. See center picture.
Throttle-valve switch plug connector connected.
Throttle valve is in idle position.
Ohmmeter must indicate approx. $0\ \Omega$ (continuity).
Open throttle valve.
Ohmmeter must indicate $\infty\ \Omega$

no

1. Disconnect the plug connection from the throttle valve switch. See bottom picture. Connect an ohmmeter one after the other to:

Throttle valve
switch plug
connection
(wiring-harness
end)

Electronic
ignition control
unit plug

Term. 1 and
Term. 2 and

Term. 2
vehicle ground

The ohmmeter must read approx. $0\ \Omega$ (continuity). Eliminate any break.

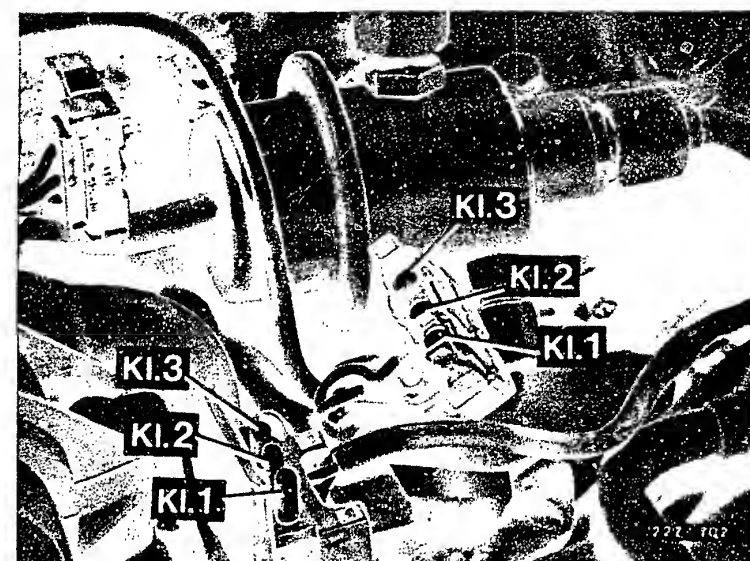
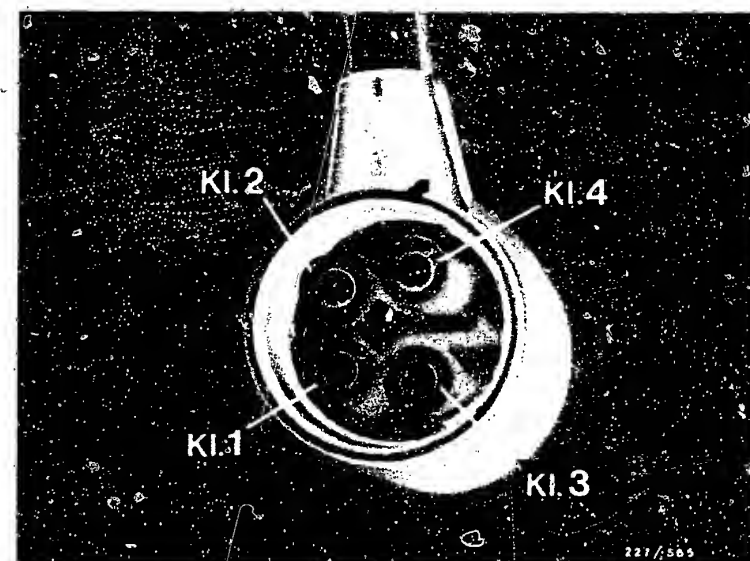
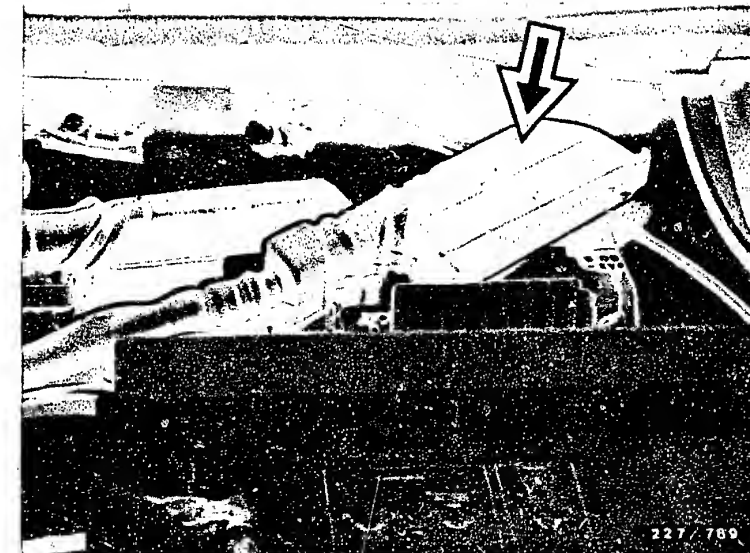
2. Connect the ohmmeter to the throttle valve switch plug connection Term. 1 and Term. 2. See the Figure at the bottom. The throttle valve is closed.
Resistance approx. $0\ \Omega$

Open the throttle valve. The ohmmeter must read $\infty\ \Omega$.

If resistance not O.K., replace throttle-valve switch.

yes

Continued on M1/M2



L23

Trouble-shooting program
Mercedes-Benz



L24

Trouble-shooting program
Mercedes-Benz



yes

Check the voltage supply to the electronic ignition control unit and the ignition coil.

Connect the voltmeter and test prod to the diagnosis socket Term. 5 (+) and the battery terminal (-). See the Figure.

Run the engine at idle.

The voltage measured must be 12 ... 14 V and must not be more than 1 V less than battery voltage.

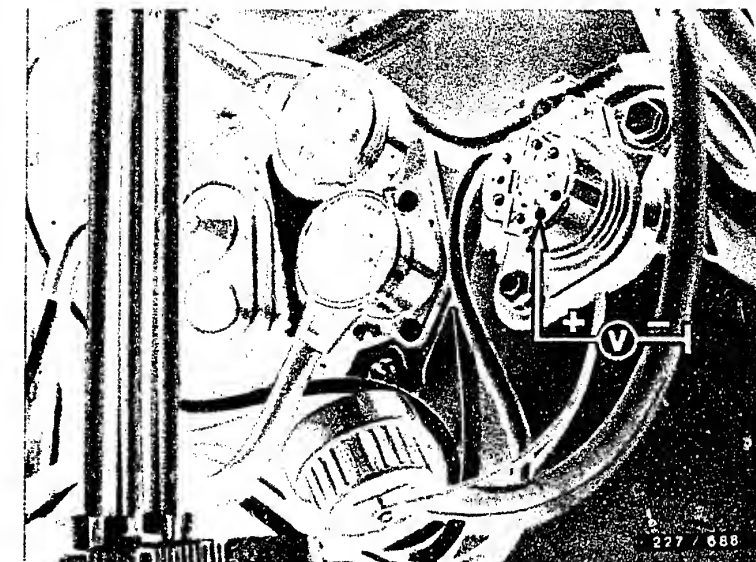
Is the value for voltage O.K.?

no

Disconnect the positive lead from the battery. Switch the ignition on. Check the leads from the positive battery terminal to the ignition coil Term. 15 for contact resistance.

Max. contact resistance 0.3 Ω .
(Take the resistance of the test lead and the test prods into consideration.)

Eliminate any contact resistance.



Diagnosis socket
e.g. vehicle type 124

yes

Continued on M3/M4

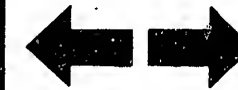
M1

Trouble-shooting program
Mercedes-Benz



M2

Trouble-shooting program
Mercedes-Benz

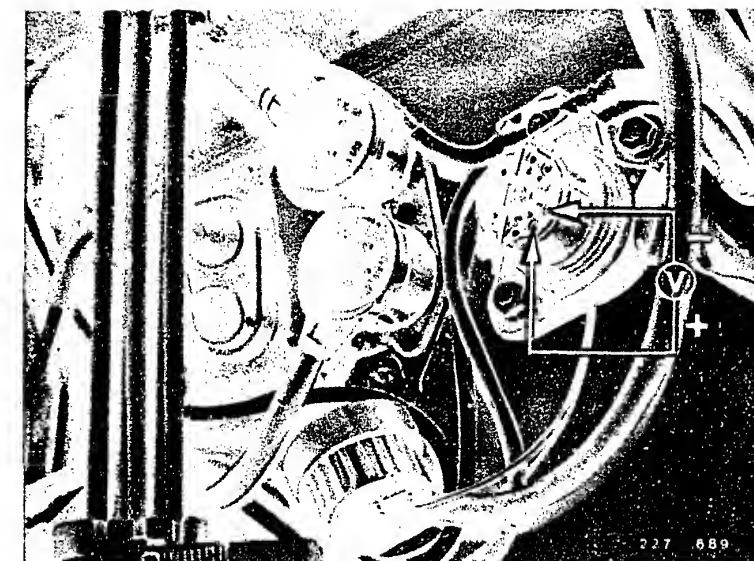


yes

Check peak-coil-current cut-off.
Connect voltmeter with test prods to diagnostic socket term. 5 (+) and term. 4 (-).
See picture.
Switch the ignition on. For approx. 1 sec. the voltmeter can move a short distance.
The voltmeter must return to 0 V.
Is the value for voltage (0 V) O.K.?

no

Take out and replace the electronic ignition control unit and the ignition coil.



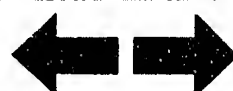
Diagnosis socket
e.g. vehicle type 124

yes

Continued on M5/M6

M3

Trouble-shooting program
Mercedes-Benz



M4

Trouble-shooting program
Mercedes-Benz



yes

Test primary voltage.
(If MOT series available).
Connect oscilloscope (e.g. MOT 201) together
with pulse shaper 1 684 463 154 to ignition
coil according to operatin instructions.
Note: Incorrect reading without pulse shaper.
Allow engine to idle.
Measured primary voltage must be 280-360 V.
See graph.

Voltage correct?

no

Take out and replace the electronic
ignition control unit.

yes

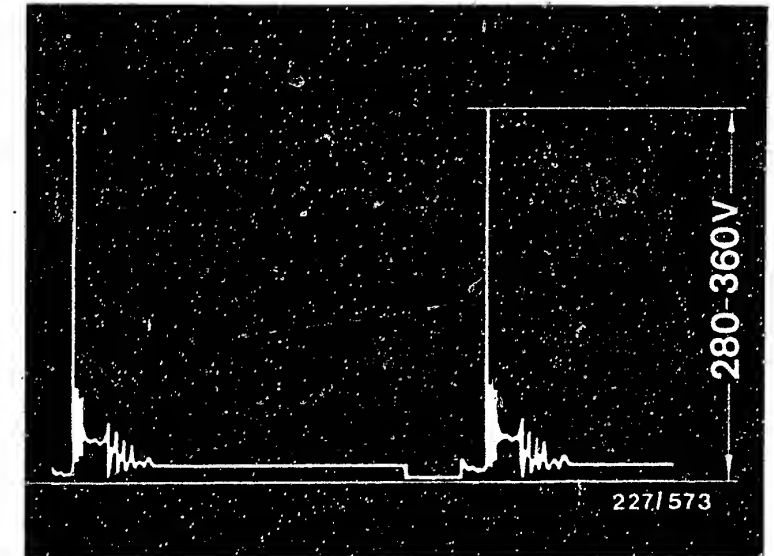
If all test steps were OK and customer
complaint has not yet been eliminated, try
installing prescribed ignition coil.
If customer complaint still not eliminated,
re-install "old" ignition coil.
Ignition system OK.

Testing completed

Testing as of M7 no longer necessary.

Note:

There may still be defects in the fuel system,
or the engine can be mechanically out of
order.



M5

Trouble-shooting program
Mercedes-Benz



M6

Trouble-shooting program
Mercedes-Benz



No primary voltage or no ignition spark.

(Continued from L9/L10)

yes

Check insulation of pulse generator.

Disconnect the electronic ignition control unit plug and connect an ohmmeter to Term. 7 and the battery terminal (-). See the Figure at the top. The ohmmeter must read $\infty \Omega$. Is the value for resistance O.K.?

no

If the value for resistance is approx. 0Ω , take out and replace the pulse generator. See the Figure at the bottom.

yes

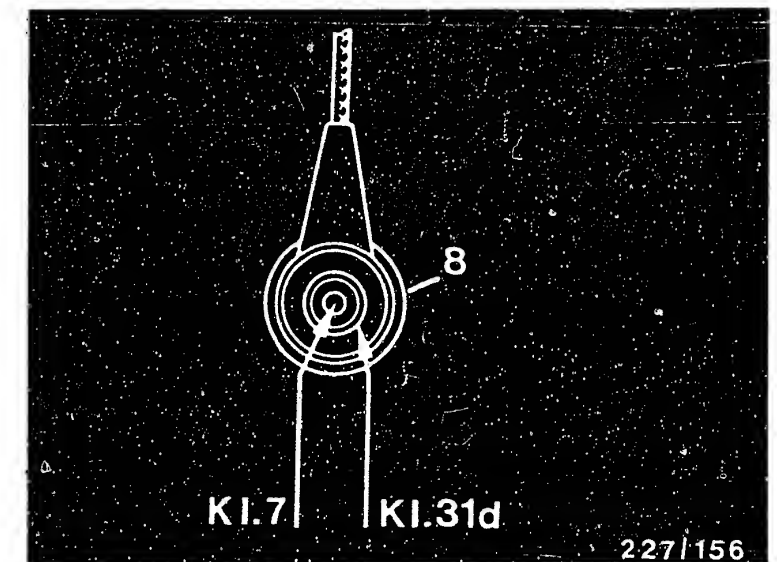
Check the internal resistance of the pulse generator.

Disconnect the electronic ignition control unit plug and connect an ohmmeter to Term. 7 and Term. 31d. See the Figure at the top. The ohmmeter must read $680 \dots 1200 \Omega$. Is the value for resistance O.K.?

Take out and replace the pulse generator. See the Figure at the bottom.

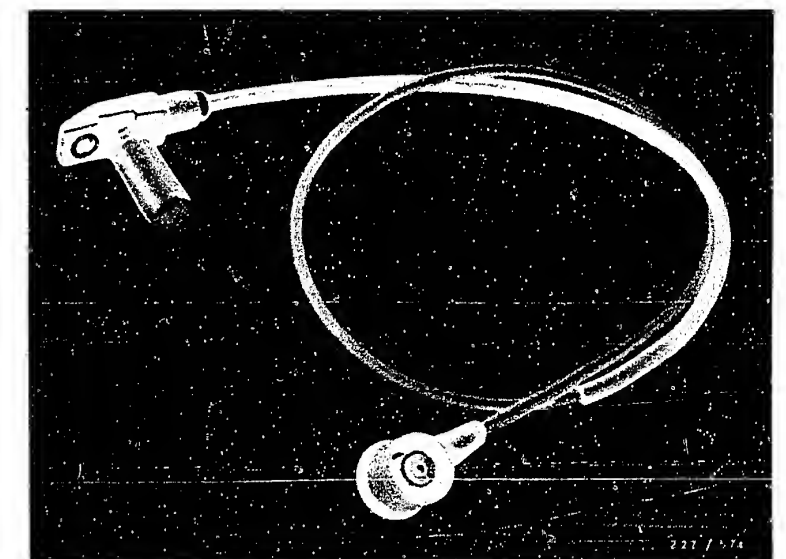
yes

Continued on M9/M10



8=Electronic ignition control unit plug - pulse generator

Pulse generator



M7

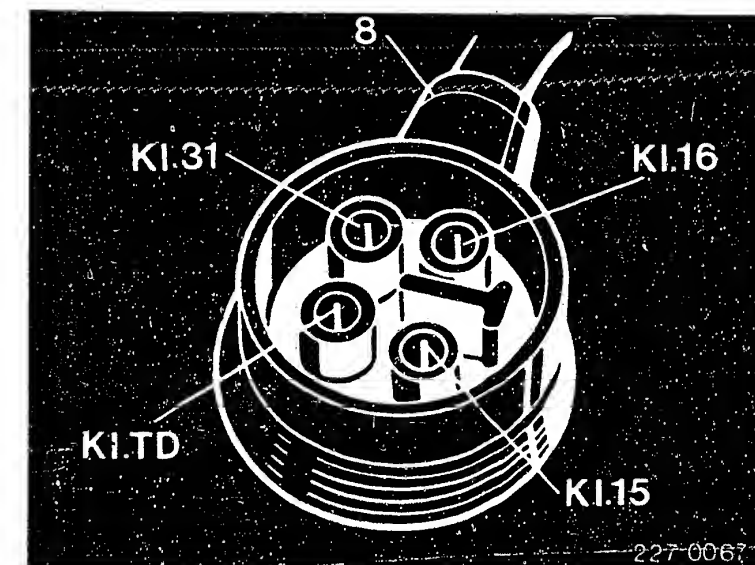
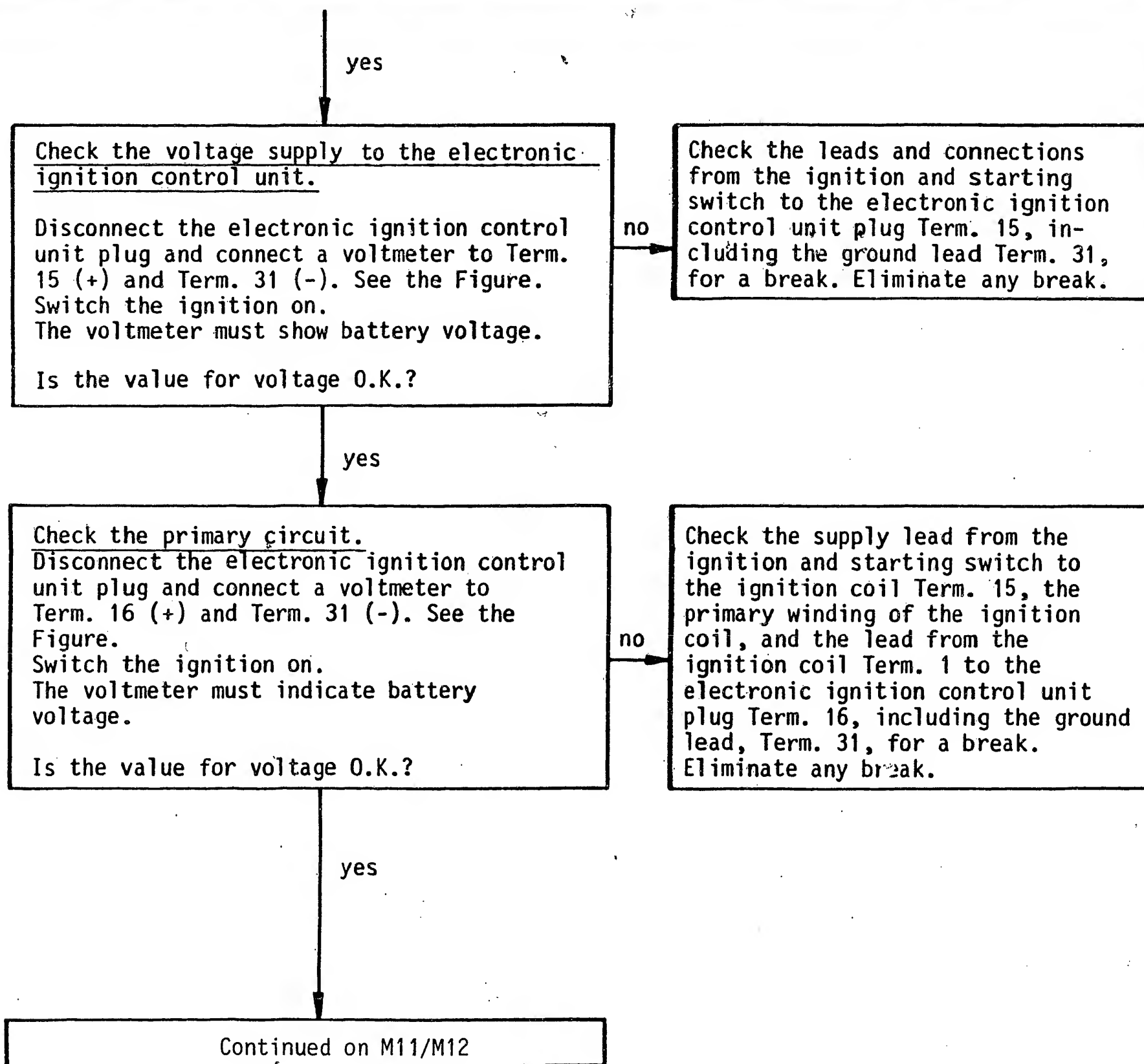
Trouble-shooting program
Mercedes-Benz



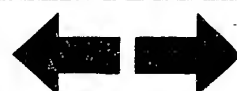
M8

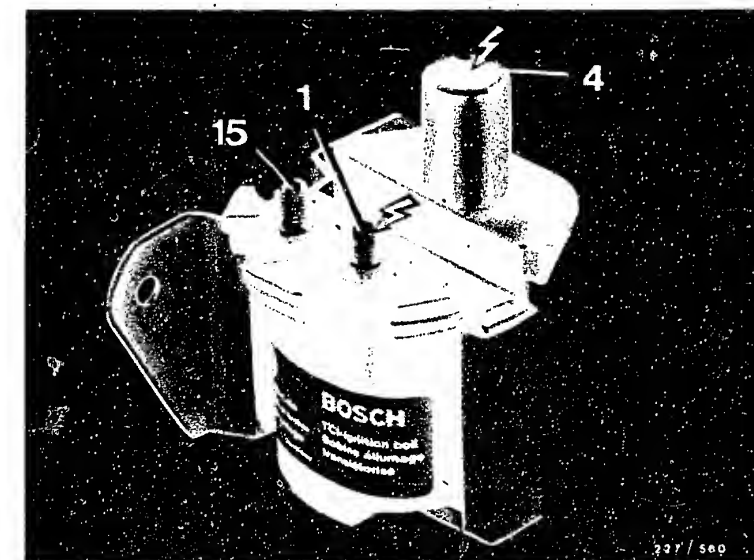
Trouble-shooting program
Mercedes-Benz



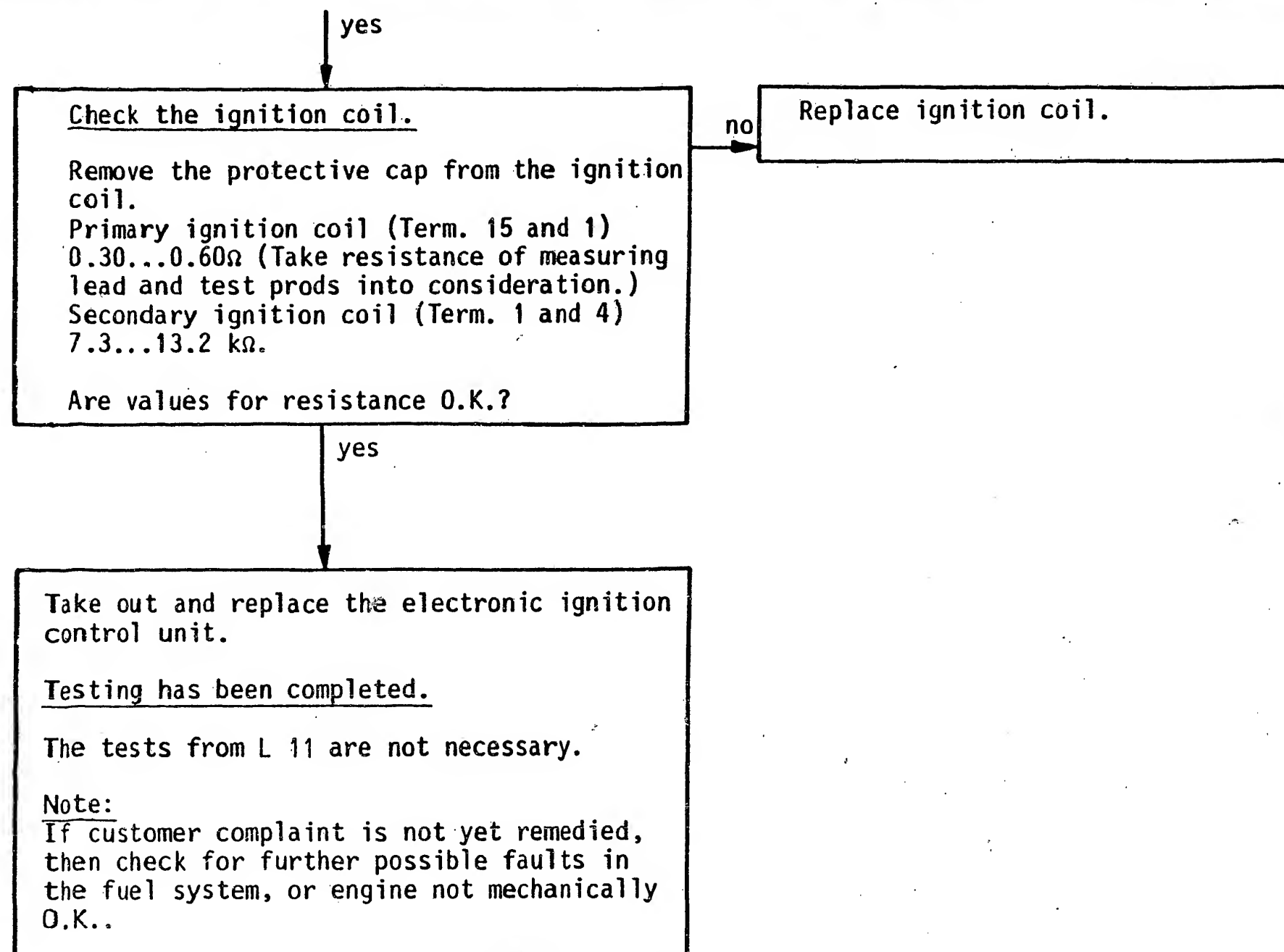


8=Electronic ignition control unit plug





High voltage arrows:
Warning, 400 V ... 25 kV!



M11

Trouble-shooting program
Mercedes-Benz



M12

Trouble-shooting program
Mercedes-Benz



After-sales Service

Technical Bulletin

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22

Danger of Accident on Semi-conductor Ignition Systems

VDT-I-227/102 B

11.1976

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

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N1

Technical Bulletin

Mercedes-Benz

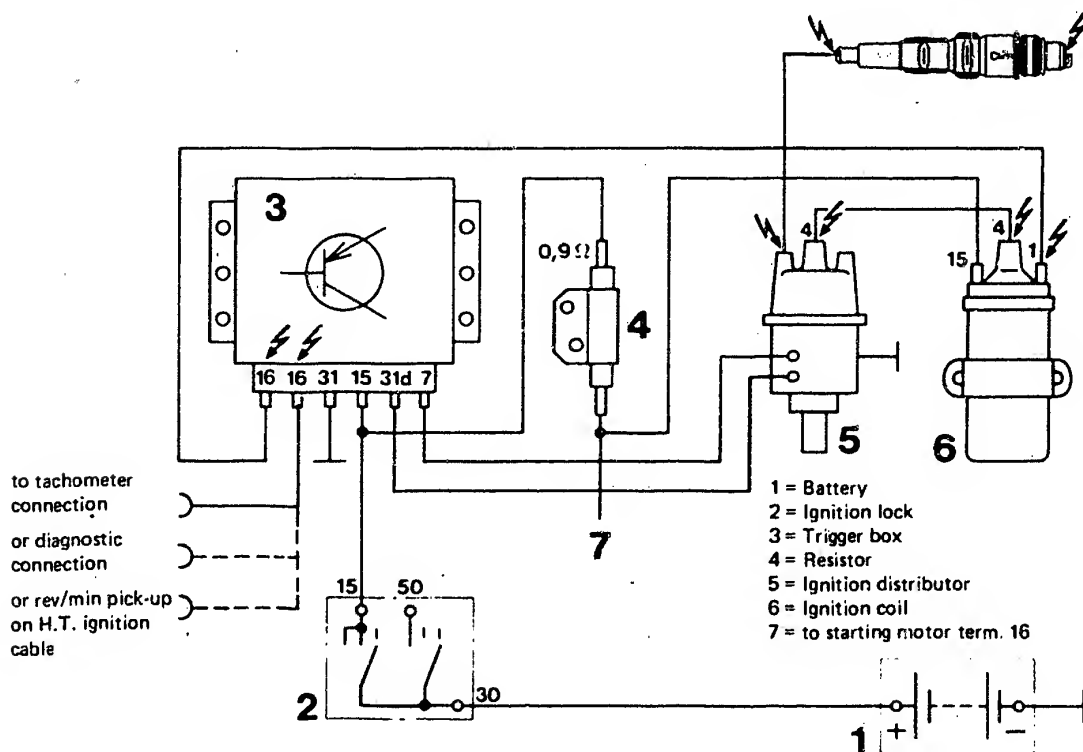


In addition, in the case of the capacitor-discharge ignition system (CDI), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram



After-sales Service

Technical Bulletin

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EFFECTS OF ELECTRICAL AND ELECTRONIC
SYSTEMS ON HEART PACEMAKERS

VDT-I-227/107 En

1.1981

e.g. ignition systems, Jetronic, Motronic, ABS

Please ensure without fail that this Bulletin is passed on to your employees for their attention!

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinischen Technik" (5/80) listed the results.

The most important discoveries in this practice can be summarized from the examination report as follows:-

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.
2. With a stationary engine and the ignition switched off the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.
3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency).
Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.
4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers please carry out the necessary measures.

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N3

Technical Bulletin

Mercedes-Benz



We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.



After-sales Service

Technical Bulletin

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NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En

1.1983

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Coil ignition	SZ (CI)	-----	Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I* (TCI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
	TSZ-H	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized ignition	TZ-I* (TI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
(Trigger box in Hybrid technique)	TZ-H* (TI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)

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N5

Technical Bulletin

Mercedes-Benz



Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Breakerless semiconductor ignition with or without knock control	EZ EZ-K	- K=Knock control	Electronic (trigger box or control unit)	Electronic (control unit)	Mechanical (ignition distributor or high-voltage distributor)
Distributorless ignition with or without knock control	VZ VZ-K	- K=Knock control	Electronic (control unit)	Electronic (control unit)	Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug)

*Note: The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).



After-sales Service

Motor Vehicle Service Information

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INCORRECT DISPLAY OF ROTATIONAL SPEED AND
DWELL ANGLE ONLY WITH TRIGGER BOXES
0 227 100 ... (TCI-i, TCI-h) WITH CURRENT
LIMITATION

VDT-I-Gen. 030 En
6.80
Supersedes Ed. 3.80

For additional information see VDT-I-Gen. 032 En

1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT 001.00}	Rotational-speed	KTE 001.00
001.01}	display O.K. with these	001.02
001.02	testers	001.03
001.04		
002.00		

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild- ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan-Datsun	(Hitachi ignition system)
Fiat	(Delco ignition system)	Peugeot	(Bosch ignition system)
Ford	(Delco ignition system)	VW	(Bosch/Fairchild ignition system)
General- Motors	(HEI-ignition system)	Bosch transistorized ignition system for retrofitting 0 227 100 920	

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N7

Motor Vehicle Service Information

Mercedes-Benz



2. Test instructions

2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min⁻¹ to 1200 min⁻¹).

It is, however, possible to attain correct rot.-speed measurements as follows:

Connect a ballast resistor of 0.9 or 1.0 Ohm (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

Suggestion for user manufacture

Required parts:

1 ballast resistor 0.9 Ohm

Part No. 0 227 900 002

or

1 ballast resistor 1.0 Ohm

Part No. 0 227 900 101

2 blade receptacles e.g.

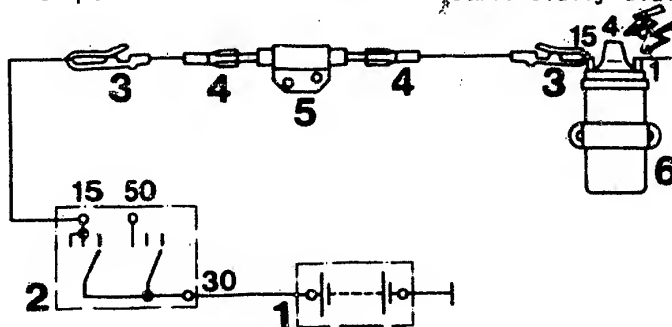
Part No. 1 901 355 881

approx. 0.2 m cable, 1.5 mm² e.g.

Part No. 6 210 150 150

2 insulated clips

Commercially available



1 = Battery

4 = Blade receptacle

⚡ approx. 400 V

2 = Ignition switch

5 = Ballast resistor

⚡ approx. 25 kV

3 = Clips

6 = Ignition coil

2.2 Dwell angle

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

2.3 Ignition point

Is displayed correctly. Connect tester as per operating instructions.



After-sales Service

Motor Vehicle Service Information

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MOTORTESTER CONVERSION

VDT-I-Gen. 032 En
6.80

Incorrect display of rotational speed,
dwell angle and ignition point
only with trigger boxes
0 227 100 ... (TCI-i, TCI-h) with current
limitation

For additional information see VDT-I-Gen. 030 of 6.80

Re.: Motortester EFAW 268
268 S 10
269
214 B
AE 2000

1. General

Please make sure that the above-mentioned motortesters in your workshop and at your customers (e.g. motor vehicle workshops, oil companies, gas stations, vocational schools etc.) are converted. The conversion is subject to payment and is carried out by the K7 after-sales service of the responsible BG. The standard time is 15 work units (with fitting of switch).

2. Why motortester conversion?

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle as well as to incorrect triggering of the meter when testing the ignition system. There is, however, no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Since, with the above-listed motortesters, the timing light is triggered by the signal path dwell angle - meter, this incorrect triggering also leads to incorrect flashing and thus to an incorrect display of the advance angle.

3. Conversion measures

The situation is to be remedied by modifying the wiring of the testers so that the timing light is triggered by the clamp-on induction pickup and the pulse shaper stage.

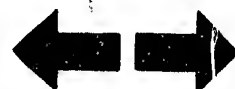
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4. Test instructions

4.1 Standard ignition systems

Switch position: "standard"

All other tester connections as per operating instructions.

4.2 Ignition systems with current limitation

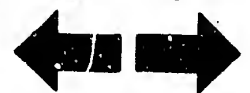
Switch position: "current limitation"

In order to trigger the timing light, the induction-type pulse generator (clamp-on pickup or red pickup) must always be connected during the measurement.

The selector switch for ignition systems built into the motortester must be switched to standard coil ignition (not to TCI) with these ignition systems.

All other tester connections as per operating instructions.

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.



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TESTS ON ELECTRONIC IGNITION SYSTEMS
(TCI, TZ)
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En
3.1981

The following tests are listed in older and current Tester operating instructions or in Trouble-shooting with the oscillograph.:

- "Separate ignition coil test" (concerns EFAW 213, 214, 268, AE 2000).
- Calculating the "ignition voltage reserve" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).
- "Intensified insulation test" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should not be carried out on transistorized ignition systems.

The contents of this Service Information has already been published in the K7-Information K7-VJF 17/8012.

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